

OVERSIGHT ON DOMESTIC RENEWABLE FUELS: FROM ETHANOL TO ADVANCED BIOFUELS

HEARING BEFORE THE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

ONE HUNDRED TWELFTH CONGRESS

FIRST SESSION

APRIL 13, 2011

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ONE HUNDRED TWELFTH CONGRESS
FIRST SESSION

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OVERSIGHT ON DOMESTIC RENEWABLE FUELS: FROM ETHANOL TO ADVANCED BIOFUELS

WEDNESDAY, APRIL 13, 2011

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Washington, DC.

The full committee met, pursuant to notice, at 10:05 a.m. in room 406, Dirksen Senate Office Building, Hon. Barbara Boxer (chairman of the committee) presiding.

Present: Senators Boxer, Inhofe, Lautenberg, Whitehouse, Udall, Merkley, Johanns and Boozman.

STATEMENT OF HON. BARBARA BOXER, U.S. SENATOR FROM THE STATE OF CALIFORNIA

Senator BOXER. Welcome to this important hearing.

This hearing will focus on the Federal Government's efforts to increase our Nation's energy independence by expanding our Nation's production of renewable fuels. President Richard Nixon recognized the need to reduce our dependence on foreign energy when he created Project Independence. That was in 1973. We are still working at it. It goes on.

In 2005, Congress set goals of production of renewable fuels and in 2007 Congress expanded the goals. Congress also called for the increased use of fuels such as cellulosic ethanol and advanced biofuels which can turn waste into fuel.

Just this March, President Obama redoubled the Federal Government's commitment to energy independence and the use of renewable fuels when he issued the blueprint for a secure energy future. When he released this study, he emphasized our Nation must discover and produce cleaner renewable sources of energy that also produce less carbon pollution which is threatening our climate. That is his quote.

The President also highlighted the support that our armed forces have for the use of biofuels. The Air Force has the Raptor 22, a jet that flies faster than the speed of sound using a fuel blended with biofuels. The Air Force has a goal of getting half of its domestic jet fuel from alternative sources.

I support the use of advanced and cellulosic biofuels and believe the Federal Government should be developing stronger initiatives to promote their use.

Today's oversight hearing on the Renewable Fuels Standard will help us better understand the current status of these critical issues and I look forward to hearing from our witnesses.

I am also happy to call on my friend, my Ranking Member.

**STATEMENT OF HON. JAMES M. INHOFE, U.S. SENATOR FROM
THE STATE OF OKLAHOMA**

Senator INHOFE. Thank you, Madam Chairman. This is one of the times when I can just say I agree with you and then not have an opening statement.

Senator BOXER. Could you say that again? Could you say that again?

[Laughter.]

Senator BOXER. Because it sounds so great.

Senator INHOFE. Do not get your hopes up.

[Laughter.]

Senator INHOFE. First of all, Secretary Vilsack, I am very happy to have you here. I am also from Iowa, so I know of the background. I know that the subject here today is going to be pretty much, it is not partisan, but it is geography, and so we understand that.

First of all, I want to mention that there is a lot of discussion on the corn-based ethanol. I have legislation that I, we have not started trying to get co-sponsors and all that, but it is to opt out. What it does, to opt out a State has to pass a bill, signed by the Governor, stating its choice.

It does not mean that they cannot use, if they want to use, all the corn ethanol or anything else they want to use. But it means, as is in the case of my State of Oklahoma today, not in Virginia, not in Maryland, not in the District, but in Oklahoma, that if you want to use clear gas, as it is called, without any of the corn ethanol, you can do it.

So, it does not, it would be very hard to argue against it because you are giving people the choice. You can either have it or you do not have to have it.

I think with the passage of the 2007 Energy Bill that Congress blundered in pushing too much of the corn ethanol too fast, and the ethanol has serious problems including its compatibility with existing engines and its environmental sustainability as well as its transportation infrastructure needs.

I think we have some witnesses that we are going to be able to get some answers from on the next panel, and you may want to address this also, that the overly aggressive ethanol mandate has led to a particularly pronounced consumer backlash, not just in my home State, but I suspect all around. You have a lot of these engines, small engines, farm engines, that can run on, they can make it on maybe E10 but not on anything more than that. So, that is a problem that we have.

I recognize people like my very good friend, Senator Johanns, is from a corn State. Oddly enough, I am from a corn State, too. But I would like to have the people in my State of Oklahoma have that choice. So, we are going to be having a chance to talk about this as opposed to just doing away with subsidies, just offering the choice.

Now, I think that we are for all of the above. We have to do it. I do not talk about this in terms of our dependence on foreign countries for our ability to produce energy because our problem is we have all the energy we need in America, but politically we cannot get at our energy. But that is not really the subject of this thing today.

So, I look forward to the hearing and I think we will find a lot of agreement.

[The prepared statement of Senator Inhofe follows:]

STATEMENT OF HON. JAMES M. INHOFE, U.S. SENATOR FROM THE
STATE OF OKLAHOMA

I'd first like to thank the Chairman for holding this timely hearing. I'm working on introducing a simple bill that responds to the increasing call for more consumer choice to purchase ethanol-free gasoline. Simply put, my bill is a compromise that allows a State to opt out of the corn ethanol portions of the renewable fuel standard—if you want to use ethanol you can use it.

To opt out, a State must pass a bill, signed by the Governor, stating its choice. The opt-out would be recognized by the Administrator of the EPA, who would then reduce the amount of the national corn ethanol mandate by the percentage amount approved by the State in question.

This legislation would allow a State to opt-out of only the corn ethanol mandate. It would not affect other portions of the renewable fuel standard, such as the cellulosic or advanced biofuels volumetric requirements.

With the passage of the 2007 energy bill, I believe Congress blundered in pushing too much corn ethanol too fast. Ethanol has serious problems, including its compatibility with existing engines, its environmental sustainability, as well as its transportation and infrastructure needs. These problems have galvanized an unusual coalition against corn-based ethanol. Opponents range from Friends of the Earth and the Environmental Working Group to the National Marine Manufacturers Association and the National Petrochemical and Refiners Association.

This overly aggressive ethanol mandate has also led to a particularly pronounced consumer backlash in my home State of Oklahoma, where one convenience store chain experienced a 30 percent drop in fuel sales once they began selling fuel blended at E-10 levels.

Despite the drawbacks of today's corn-based ethanol mandates, I do support a role for ethanol and other biofuels. The idea that we can grow and produce biofuels all over the country—not just in the Midwest—is something worth pursuing—and that's why I support research into a variety of advanced feedstocks and alternatives such as algae, bio-butanol, cellulosic, natural gas, and other options.

I believe America's energy supply should be stable, clean, diverse, and affordable. Continued development of home-grown biofuels translates into energy security and creates jobs and economic growth in America.

On that note, I look forward to working with each of you to explore the unintended consequences of this mandate and how we can improve the Renewable Fuel Standard.

Senator BOXER. Well, that is good.

Senator Johanns, welcome.

STATEMENT OF HON. MIKE JOHANNS, U.S. SENATOR FROM
THE STATE OF NEBRASKA

Senator JOHANNNS. Madam Chair, thank you very much.

Mr. Secretary, it is good to see you again.

I appreciate the opportunity to just offer a few words before we get started today. I think, as everybody knows, I have long been a supporter of renewable energy sources, including ethanol specifically. As a former Governor, I worked to create new incentives for ethanol production, did all I could to increase the ethanol blend in gasoline to address the environmental concerns which we often-

times forget related to MTBE use. As Secretary of Agriculture, I worked with others in the Cabinet to promote renewable energy.

Agriculture is a part of the solution, not only for the short-term, but for the long-term domestic energy needs. Renewable fuel production increases our energy security and decreases our dependence on foreign oil.

Currently, around 60 percent of our oil is imported from other countries. We are very energy dependent. We all agree that we have to take steps to become less reliant on other nations, for our energy needs. Renewable fuel production, including ethanol, can play a role.

The production and use of 10.6 billion gallons of ethanol in 2010 displaced about 445 million barrels of oil and it kept \$34 billion in the United States' economy. We have invested in domestic renewable fuels, we have built the infrastructure, we have hired good people and it has been a boost to our rural economy.

In 2010, the ethanol industry supported more than 400,000 jobs in the United States. It contributed \$53.6 billion to the National Gross Domestic Product and generated \$11 billion in tax revenues.

Nebraska is the second largest producer of ethanol in the United States. Currently, the State has 24 plants with a combined production capacity of over 1.8 billion gallons annually. These plants represent \$1.4 billion in capital investment and employment of roughly 1,000 Nebraskans. While ethanol production helps sustain profitability for corn producers, its byproduct, distiller grains, adds value to our livestock sector.

Today, the renewable fuels industry is at a critical point. That is why I appreciate this hearing, Madam Chair. We need to do everything we can to look at the whole picture here because I think that we all agree that what we are doing here can have a profound impact on our energy dependence on other countries in the future.

With that, I will look forward to the hearing and the opportunity to ask questions.

Thank you.

[The prepared statement of Senator Johanns follows:]

STATEMENT OF HON. MIKE JOHANN, U.S. SENATOR FROM THE STATE OF NEBRASKA

Thank you, Chairman Boxer, for calling this important hearing today. Today's hearing focuses on a topic which is important to many in my home State and across our country. I have long been a supporter of renewable energy sources, including ethanol.

As Governor, I worked to create new incentives for ethanol production and increase the ethanol blend in gasoline to address environmental concerns from MTBE use.

As Secretary of Agriculture, I worked with others in the Cabinet to promote renewable energy as a way to reduce our dependence on foreign oil. Agriculture is part of the solution not only for the short-term but for our long-term domestic energy needs. Renewable fuel production increases our energy security and decreases our dependence on foreign oil. Currently, around 60 percent of our oil is imported from other countries, many with which do not share our values. We have to take steps to become less reliant on these nations for our energy needs and more reliant on domestic sources.

Renewable fuel production, including ethanol, can play a role. The production and use of 10.6 billion gallons of ethanol in 2010 displaced over 445 million barrels of oil and kept \$34 billion in the U.S. economy. We've invested in a domestic renewable fuels industry. We've built infrastructure. We've hired good people.

Ethanol production boosts rural economies. In 2010, the ethanol industry supported more than 400,000 jobs in the United States, contributed \$53.6 billion to the

national Gross Domestic Product, and generated \$11 billion in tax revenues. Nebraska is the second-largest producer of ethanol in the country. Currently, the State has 24 operational ethanol plants, with a combined production capacity of over 1.8 billion gallons annually. These plants represent over \$1.4 billion in capital investment and provide employment for roughly 1,000 Nebraskans. While ethanol production helps sustain profitability for corn producers, its byproduct—distillers grains—also adds value to the livestock sector, particularly Nebraska's beef producers.

Today, the renewable fuels industry is at a pivotal point—tax credits expire at the end of this year; some have concerns about using potential food or feed sources for fuel; we are seeing increases in energy costs across the board. And, at this point, three key factors come to mind:

(1) The increased productivity of American agriculture continues to amaze me. Farmers are growing more corn per acre every year. In 1980, U.S. farmers produced about 6.6 billion bushels of corn. By 2010, that number had nearly doubled to 12.4 billion bushels. And, due to significant advances in efficiency, that production increase was accomplished on almost exactly the same amount of land—about 85 million acres.

(2) Ethanol has been and will continue to be part of our domestic energy solution. We've built the infrastructure. We have industry investing in next generation technologies. We cannot turn our backs on this good work.

(3) Renewable fuels are not some faceless adversary. This industry represents thousands of jobs in rural communities. When we are looking at employment numbers across the country, renewable fuels jobs in my State and elsewhere have been key in weathering our economic challenges in recent years.

I think everyone on this panel can agree that these issues are complex and abrupt changes in policy could have real impacts on domestic energy sources, jobs, and local economies. As such, I look forward to engaging in a thoughtful discussion of renewable fuels policy with my colleagues on this committee and others in the Senate in the weeks and months ahead.

I look forward to hearing from our witnesses today and learning from their perspectives on an industry that is very important to the State of Nebraska and the lives of many others across our Nation.

Senator BOXER. Thank you so very much. Do you want us to put your full statement in the record?

Senator JOHANNIS. Yes, that would be great.

Senator BOXER. We will do that, as with everyone.

Senator Lautenberg, we have gone down to just 3 minutes per person because we have three panels. So, you are recognized.

STATEMENT OF HON. FRANK R. LAUTENBERG, U.S. SENATOR FROM THE STATE OF NEW JERSEY

Senator LAUTENBERG. Thanks, Madam Chairman.

Next week marks the first anniversary of the oil spill disaster in the Gulf of Mexico, our country's worst environmental catastrophe and a harsh reminder about our addiction to oil.

Under President Obama's leadership, we are finally taking steps to kick this dangerous addiction by investing in better and smarter ways of moving people and goods. This includes creating a national high speed rail network, which I was disappointed to learn today has been on the chopping block for the naysayers. This includes creating a national high speed rail network and expanding the number of electric cars on America's roads.

Of course, bullet trains and plug-in vehicles alone will not break our addiction. We must also invest in cleaner, cheaper fuels to power the Nation's automobiles.

But I have serious concerns about corn ethanol's ability to serve as one of the leading alternatives. The fact is corn ethanol is only slightly better for the environment than gasoline. Sometimes corn ethanol is more harmful.

To make room for corn crops, forests are cut down, grasslands are plowed, the equipment that farmers use to grow, harvest and ship corn is powered by burning fuel which produces more emissions. Growing corn requires enormous amounts of fertilizers and pesticides which can runoff in the rivers and seriously damage marine ecosystems, including creating so-called dead zones in the water.

Additionally, using corn for fuel instead of food drives up prices for people already struggling to put food on the table. Economists agree that steady growth and demand for ethanol has helped raise food prices including costs in the United States where almost 40 percent of the corn crop is grown for fuel, not food.

Corn ethanol also increases our deficit because the industry receives billions of dollars in wasteful subsidies. For every gallon of ethanol produced in the United States, taxpayers have to pay 45 percent. I will call it a ransom.

Last year alone, the tax credit deprived the Treasury of more than \$5 billion in revenues, according to an audit by the Government Accountability Office, which determined the industry is mature enough to stand on its own two feet.

The *Wall Street Journal* editorial page agrees. They urged Congress, 2 weeks ago, to end ethanol subsidies that are driving up the cost of food and fuel with no benefit for the environment or American energy security.

Instead of making taxpayers support this industry, we should invest in cleaner fuels such as cellulosic ethanol which is made from waste products and non-food crops. Cellulosic ethanol will not drive up the cost of food, it will not drive up the planet's temperature by generating carbon pollution or other greenhouse gases.

Madam Chairman, I ask for unanimous consent that my full statement be included in the record.

Senator BOXER. Without objection. Thank you.

[The prepared statement of Senator Lautenberg was not available at time of print.]

Well, welcome, Mr. Secretary. We are very happy to see you here and just the press of business today is major. We have three panels. So, we are going to ask you to start. If you could keep to 5 minutes and then answer our questions.

STATEMENT OF THOMAS VILSACK, SECRETARY OF AGRICULTURE, U.S. DEPARTMENT OF AGRICULTURE

Secretary VILSACK. Thank you, Madam Chair. Thank you very much for the opportunity and I will stay within the 5-minute time period.

I would ask that our statement that we provided be put in the record, and I would like to speak from the heart for just a few minutes about renewable fuels.

Senator BOXER. Yes, without objection.

Secretary VILSACK. Let me put it in context. Ninety percent of the persistent poverty counties in this country are located in rural America. Rural Americans earn \$11,000 per capita less than their urban and suburban counterparts. More than half of the rural counties in this country have lost population in the last census.

The reality is that there has been a history of unemployment and poverty at higher levels in rural America.

The ethanol industry and the renewable fuel industry now has 400 biorefineries located in 46 States which, according to a report commissioned by the Renewable Fuels Association titled "Contribution of the Ethanol Industry to the Economy of the United States," is helping to produce more than the 400,000 jobs that Senator Johanns referred to. One point nine million of the 2.1 million farmers in this country simply do not make, on average, enough money from their farming operation to support their families, which is why it is important and necessary for us to look for alternative ways for farmers to succeed.

We continue to import far too much oil from other countries. Seventeen percent of our imported oil comes from the Persian Gulf, a very unstable place today.

When the Congress established the Renewable Fuels Standard goals, what you did is created the opportunity for over \$100 billion of capital investment in rural communities, the opportunity and the chance to produce more than 1 million jobs in rural America, increased income opportunities for farmers, and reducing our dependence on that foreign oil from unstable sources.

At USDA, we have continued the work of then-Secretary Johanns and others to meet the challenge of that Renewable Fuels Standard. We have established five regional feedstock research development centers focused on feedstock development, sustainable production systems, and biorefining. We are looking for alternative ways in addition to corn-based ethanol to be able to produce 36 billion gallons of renewable fuel.

We have provided five commitments to biorefineries that are located in parts of the country other than the Midwest, and we look forward to meeting the President's challenge of breaking ground on four additional biorefinery plants in the very near future. These plants will focus on feedstocks other than corn-based ethanol.

We continue to provide assistance and help to biorefinery producers who are using advanced biofuel production mechanisms. There are now 30 pilots in operation around the country.

We just recently announced an effort to expand a more convenient ethanol supply for consumers by using some of our REAP funding to permit and to incentivize blender pumps throughout the country.

We are continuing to operate the Biomass Crop Assistance Program (BCAP) program notwithstanding the reductions that occurred as a result of the budget deal that was recently announced.

Let me respond, in the minute and a half that I have left, to some of the frequent arguments about ethanol.

First of all, the issue of food prices. It is important to point out that farmers only get 16 cents of every food dollar. Eighty-four cents goes someplace else. I think, based on the 2008 study of what happened when food prices went up the last time, we saw that ethanol production was responsible for one-tenth of the increase. I suggest that perhaps the issues of energy costs today are more responsible for increasing food costs than ethanol production.

Some have suggested that ethanol is not efficient from an energy producing and utilization perspective. Today's ethanol production

systems generate 2.3 BTUs for every BTU used, which is actually a better ratio than oil. When we reach the 36 billion gallon threshold, 138 metric tons of CO₂ equivalent will be reduced from the atmosphere, the equivalent of taking 27 million cars off the road.

The most important point I can make today is that we need to redefine this debate. Instead of trying to limit America's opportunities, particularly in rural areas, we need to look for ways in which we can expand opportunities. We should not doubt the capacity of American farmers and ranchers to be able to produce the feedstocks, beyond corn-based ethanol, to be able to meet the 36 billion gallon requirement.

I realize there is work to do and we have to accelerate our pace. But we are committed to making that happen at USDA.

Thank you, Madam Chairman.

[The prepared statement of Secretary Vilsack follows:]

STATEMENT OF SECRETARY THOMAS VILSACK
U.S. DEPARTMENT OF AGRICULTURE
BEFORE THE U.S. SENATE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
APRIL 13, 2011

Chairwoman Boxer, Ranking Member Inhofe, and members of the committee, renewable energy today offers both challenges and historic opportunities for our nation. The accelerated deployment of renewable energy is a high priority for the Obama Administration, as it has been for Congress as well, on a bipartisan basis, for many years. We are partners in this effort, and I welcome this opportunity to discuss USDA's role in helping to build a cleaner, more secure, more sustainable, and domestically-produced energy sector for future generations.

President Obama has set an ambitious goal of reducing oil imports by one-third from 2008 levels by 2025. Increasing biofuel production and use are an important part of achieving that goal, and the Administration is working on an integrated research strategy to overcome barriers to increased use of today's biofuels and accelerate the development of next-generation biofuels. This strategy includes targeted investment in biofuels distribution infrastructure, support for research, development and early-stage deployment of promising next-generation biofuels technologies, and implementation of the Renewable Fuels Standard and other key components of the regulatory framework.

USDA's commitment to renewable energy is longstanding. While there are urban and suburban sources of renewable energy, renewable energy is largely rural energy. Biofuels and biomass rely primarily on farm and forest feedstocks. Due to siting challenges, large scale wind and solar

farms, as well as geothermal plants may be located in rural areas. In addition to its environmental, energy security, and national security implications, renewable energy is an important source of jobs, economic growth, and tax revenue in rural communities across the country, while biofuels and biomass offer exciting new opportunities specifically for American agricultural producers. Our nation's future depends on out-innovating, out-investing, out-educating, and out-building our competitors in an ever-more integrated world economy, and renewable energy is clearly one of the sectors in which we must win the future.

USDA is not alone in this effort. I am pleased to be joined today by my colleagues from the Environmental Protection Agency (EPA) and the Department of Energy (DOE). The Administration recently put forth a Blueprint for a Secure Energy Future, focusing on the development of domestic renewable energy supplies to help harness America's clean energy potential. Recognizing the promise of commercial development of cellulosic and advanced biofuels, their potential contribution towards reducing our oil dependence, and the current challenges to bringing those technologies to scale, the President has set a goal of breaking ground on at least four commercial-scale cellulosic or advanced bio-refineries over the next two years. In addition, the President has challenged USDA, DOE, and Navy to investigate how to speed the development of drop-in biofuel substitutes for diesel and jet fuel.

USDA has entered into Memoranda of Understanding related to renewable energy with the Department of the Navy and with the Federal Aviation Administration (FAA) and we work closely with many partners in academia and the private sector as well. The aviation industry is a prime example of a sector that is pressing forward to transition to renewable jet biofuels. We

recognize that the future of renewable energy depends on addressing technological and regulatory challenges, as well as the financial challenge. We must drive costs down and market access up, develop self-sustaining business models that allow renewables to succeed in the marketplace, ultimately without subsidy. Accelerating that evolution in an environmentally responsible way is a key goal for USDA and the Nation.

Some have suggested that not enough food, feed, and fuel can be grown to meet our needs. However, we have seen that time and again our Nation's farmers and ranchers have risen to that challenge. Growing energy crops is another challenge for this country and the globe and we are confident that we can meet food, feed, and fuel needs while maintaining and expanding our conservation ethic and creating jobs and economic growth in rural economy.

Growing energy crops is another challenge and America's farmers, ranchers, forest landowners can do their part to meet those goals and, we at USDA, stand ready to support their can-do spirit.

Renewable Energy at USDA

USDA's support for biofuels is an important part of a much broader commitment to a cleaner and greener future; an energy policy that reduces our dependence on imported oil; and a strategy that promotes jobs and economic growth in the United States. USDA's commitment has included investment in biofuels, biomass, wind, solar, geothermal, and hydroelectric power, as well as basic scientific research into second and third generation biofuels.

This commitment is deep, broad, and longstanding, and it is supported by funding and dedicated staff from no less than 12 USDA agencies and offices:

- Rural Development
- Office of the Chief Economist
- Natural Resources Conservation Service
- National Agricultural Statistics Service
- Forest Service
- Foreign Agricultural Service
- Farm Service Agency
- Economic Research Service
- Departmental Management
- National Institute of Food and Agriculture
- Agricultural Research Service
- Agricultural Marketing Service

USDA recognizes that environmentally responsible renewable energy and energy conservation provide opportunities for economic growth and prosperity across rural America and the Nation as a whole. We are working to ensure that our programs meet and exceed the challenge of promoting economic growth and prosperity.

For example, USDA has recently announced the interim final rule and Notice of Funds Availability (NOFA) announcing \$70 million for the Rural Energy for America Program (REAP). Within this regulation, we have modified the programs to formally list Flexible Fuel Pumps as a project eligible for grants. This in conjunction with the other USDA programs will assist in our goal of 10,000 Flexible Fuel Pumps in five years.

Renewable energy offers farmers, ranchers, foresters, and rural communities tremendous opportunities. Biorefineries currently are and most will continue to be located in rural areas – close to feedstocks which will fuel the facility.

- Those providing the feedstock will have a choice as to what to produce and a local and reliable demand for their product. Farmers would be less susceptible to volatility in export markets influencing the price they receive for the biomass produced. Dedicated energy crops (i.e., switchgrass or miscanthus) are expected to be produced on environmentally-sensitive marginal lands which are less suited for food production, but able to generate a positive economic return. Also, research into these crops are indicating that in some cases these crops will improve land conditions.
- The operation of the biorefinery (or an integrated biorefinery which can produce renewable energy and high-valued biobased products) creates direct jobs; for those who will work in the facility. Storage, rail, and road infrastructure will likely develop to move feedstocks from the farm gate and renewable fuel to blending terminals and the market.
- The construction of the facility creates economic growth for the local community. Those workers building the facility, the materials needed to construct the facility, transportation and other ancillary services required all generate economic activity and lead to income generation, economic growth and added job creation.

- Collectively, growing economic prospects are expected to lead to improvements in education and health facilities in the rural sector – further job creation and improve prosperity in rural America.

USDA supports the entire supply chain of renewable energy production and use: from feedstock research and development through to biofuels infrastructure development. Key USDA programs include:

- Bioenergy Program for Advanced Biofuels. This program provides payments to ensure an expanding production of advanced biofuels by providing payments to eligible advanced biofuel producers in rural areas for the production of fuel derived from renewable biomass other than corn kernel starch.
- Biorefinery Assistance Program. This program guarantees loans financed by the private sector for the construction and development of biorefineries that employ eligible technology for the production of advanced biofuels.
- Repowering Assistance Program. This program makes payments to eligible biorefineries to encourage the use of renewable biomass as a replacement fuel source for fossil fuels used to provide heat or power in the operation of these eligible biorefineries.

Interim final rules were published in February 2011 for the programs mentioned above and NOFA's were issued in March 2011. We are currently accepting applications for these programs.

- Biomass Crop Assistance Program (BCAP). USDA's Farm Service Agency assists in partnership development between biomass energy facilities and farmers or forest landowners who can apply to become a "project area" for growing new biomass. If selected, the farmers can receive up to 75 percent of the cost of establishing a perennial crop, and an annual payment to maintain that crop – for up to 15 years if it's a new woody crop, or up to 5 years if it's a new herbaceous crop. These crops cannot be invasive species, nor can these crops be conventional crops that already receive assistance from USDA, like corn, soybeans, wheat, cotton or rice.

Also, biomass producers can receive matching payments of one dollar per dollar of biomass that is delivered to an energy facility, up to \$45 per ton. This can be existing biomass, but it must be collected or harvested directly from the land, using a conservation or forest stewardship plan, and if woody biomass, cannot have an existing market, and must be removed to reduce fire, disease, invasive species threats, or improve ecosystem health.

During the initial round of funding in late 2009 and early 2010, BCAP matching payments provided opportunities to produce energy from biomass while simultaneously accomplishing horticultural or silvacultural purposes. For example, one small family-

owned California forestry company was able to salvage for energy its timber that had been seriously burned and degraded in a forest fire several years previous. Another company was able to acquire older, non-productive orchard waste for energy that otherwise would have been burned, generating electricity instead of smoke and ash in the open air. A third enterprise was able to transform biomass into energy by removing woody fire fuel hazards from forests tracts that previous was uneconomical to retrieve, helping to reduce the threat of forest fires.

- Rural Energy for America Program (REAP). REAP provides grants and loan guarantees for energy audits and renewable energy development assistance. This includes funding for agricultural producers and rural small businesses to purchase and install renewable energy systems (bioenergy, geothermal, hydrogen, solar, wind and hydro power) and to make energy efficiency improvements including, for example, flexible fuel pumps as noted earlier.

In FY 2010, the REAP provided 2,400 grants and loan guarantees totaling \$159 million in program level support for energy audit projects and energy efficiency and renewable energy projects that ranged from biofuels to wind, solar, geothermal, anaerobic digesters, hydroelectric, and biomass projects. Also, in FY 2010, through USDA's Rural Utilities Service (RUS), the American Samoa Power Authority received \$3.1 million in total funding, including a grant of \$1.1 million to fund an engineering and environmental feasibility study for a renewable energy project to replace generation facilities destroyed

by the 2009 tsunami. During FY 2010, RUS approved \$313 million for renewable energy projects.

A family-owned California farm with 500 acres of farmland and 1,500 dairy cows leveraged a \$500,000 REAP grant to finance the installation at its dairy farm of a mesophilic digester system to create biogas from manure and silage to power a 710 kw combined heat and power unit. The system has the capacity to generate up to 6 million kwh annually of electricity and 20,150 MMBtu/year of heat. Surplus power generated by the system is sold to the local utility.

- USDA BioPreferred Program. This program promotes the awareness and federal procurement of biobased commercial and industrial products (made from renewable plant and animal sources) for non-renewable goods and materials. USDA has an online catalog of more than 10,800 qualifying biobased commercial and industrial products.
- Business and Industry Guaranteed Loan Program (B&I). B&I provides assistance to rural businesses seeking to expand and create jobs in rural communities. While not targeted to biofuels or other renewable energy projects, the B&I program over the years has made investments in this critical growth sector.
- Environmental Quality Incentives Program (EQIP). EQIP is a voluntary conservation program administered by USDA's Natural Resources and Conservation Service for farmers, ranchers and owners of private, non-industrial forest land that promotes

agricultural production, forest management, and environmental quality as compatible national goals. EQIP offers financial and technical help to assist eligible producers install or implement conservation practices on eligible agricultural land. The 2008 Farm Bill added energy as a resource concern. Through EQIP, USDA is assisting producers to assess their energy use (energy audits) and apply conservation practices that save energy and protect natural resources.

- Conservation Innovation Grants (CIG). CIG is a voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging Federal investment in environmental enhancement and protection, in conjunction with agricultural production. Under CIG, Environmental Quality Incentives Program funds are used to award competitive grants to non-Federal governmental or non-governmental organizations, Tribes, or individuals.

Energy-related grants have funded innovative tools to estimate the energy and fossil fuel implications of cropland agronomic practices to be based on sound science and data, yet be useable by farmers and conservationists, life cycle analyses for current conservation practices to assess the energy and fossil fuel implications associated with the use of the practice including analyzing the fossil fuel embedded in materials and agrochemicals, innovative implementation systems to achieve greater use of energy audits including energy audits that address cropland in addition to buildings and equipment, innovative on-farm energy conservation technologies, innovative on-farm applications of renewable

energy production technologies to displace fossil fuel energy, and sustainable biomass production, harvest, and handling technologies.

- USDA Electric Program. This program provides financial assistance to rural electric cooperatives to acquire, construct, extend, upgrade, and otherwise improve energy generation, transmission, or distribution facilities. The Electric Program is working with borrowers to increase investment in wind, biomass, and solar generation.

To spur advanced biofuels, USDA has an aggressive research agenda. We have completed a biofuels roadmap identifying potential pathways to meeting congressionally mandated – RFS2 – goals for national biofuels production. We have established five regional research centers working on the science necessary to ensure profitable biofuels can be produced from a diverse range of feedstocks. And from 2008 – 2010, approximately 30 grants totaling about \$30 million were jointly awarded by USDA’s National Institute of Food and Agriculture and DOE to accelerate fundamental genomic research of cellulosic bioenergy feedstock crops, such as fast-growing trees, shrubs, and grasses.

USDA actively supports the commercialization of advanced biofuels. We are investing in advanced biofuels and biomass energy projects in each of the five regions of the country identified by our Biofuels Roadmap, funding construction and updates to production facilities as well as feasibility studies in 27 States and the Western Pacific.

USDA's five Regional Biomass Research Centers are accelerating the development of a commercial advanced biofuels industry across the United States. The Centers' research are supporting what USDA anticipates will be billions of dollars in investments for new biorefineries needed to deliver 21 billion gallons of advanced biofuels per year by 2022. The Centers are developing new varieties of dedicated energy crops that are highly productive and efficiently use water and fertilizers. One powerful tool being applied is the genetic map of switchgrass, developed by ARS to enhance and accelerate breeding the best feedstocks. Other research is developing the most sustainable ways to incorporate the production and harvest of feedstocks from our farms and forests.

ARS is partnering with the Federal Aviation Administration and the USDA Office of Energy Policy and New Uses to develop the Feedstock Readiness Level Tool to complement the aviation industries' Fuel Readiness Level Tool. This will help the airline industry assess the status of biomass feedstocks for use in the production of biobased jet fuels. This effort supports the Department's *Farm to Fly* initiative, in which we have partnered with the airlines and aviation industry to identify opportunities for commercial production and use of renewable jet biofuels.

The ARS laboratory in Wyndmoor, Pennsylvania, partnered with scientists at Genencor/Danisco to develop a new chemical cocktail and process that will increase ethanol yield from barley – a crop that has not yet been approved by the EPA for ethanol production. Farmers from southern Pennsylvania to South Carolina could profit from using a new two-year rotation of corn followed by winter barley and then soybeans that protects soils, prevents fertilizers from washing into the Chesapeake Bay, and produces grain on land that otherwise would be fallow over the winter.

Osage Bio Energy will use this technology when its new ethanol plant in Hopewell, Virginia, opens in April 2011. Plant construction has provided over 500 construction jobs, leveraged over \$150 million in procurement and labor, and will create 50 new permanent jobs for operating the plant. The new ethanol plant is expected to generate \$2 million in tax revenue every year for the city of Hopewell.

The ARS Sugarcane Research Unit at Houma, Louisiana, is working with British Petroleum and Claflin University to test four experimental energy cane varieties developed by ARS as bioenergy feedstocks. Also, ARS has begun a breeding program for sugarcane and energy cane improvement that will provide important new sources of genetic diversity. These materials contain valuable genes to increase biomass and impart traits that will increase production efficiencies and geographic range of sugarcane and bioenergy feedstocks. This effort will increase germplasm diversity and thus, the potential for direct and future commercial development of sugarcane and biofuels industries.

ARS scientists developed a method using near-infrared light for quickly predicting biomass ethanol yield from switchgrass. The method will be useful for feedstock breeding, genetics, and management research, and can also be used by biorefiners to determine ethanol yield from a particular biomass feedstock. ARS has agreed to distribute its technology to public and private researchers to enable more rapid analysis and more rapid improvement of switchgrass feedstocks.

A partnership of ARS and Iowa State University researchers developed a process that first releases and ferments certain sugars to ethanol, then releases glucose and simultaneously converts it to ethanol with brewer's yeast. Using this process, an ethanol yield of over 75 gallon per ton was achieved from corn stover.

ARS bioenergy research works to develop the best possible feedstocks, ways to produce those feedstocks sustainably on a large scale, the best processes for converting the biomass into economically valuable fuels and other products, and then transfer that technology, methods, and varieties to users.

The Biomass Research and Development Initiative (BRDI) is a grant program that provides funding for research and development of technologies and processes to produce biofuels, bioenergy and high-value biobased products. These projects support the Administration's comprehensive energy strategy of increasing the Nation's energy, economic and national security by reducing our reliance on foreign oil and reducing greenhouse gases. The projects aim to create a diverse group of economically- and environmentally-sustainable sources of renewable biomass. BRDI provides direction and guidance on the technical areas including feedstock development, biofuels and biobased products development, and biofuels development analysis.

The Forest Service is actively working on a number of fronts to broaden the use of woody biomass in the Nation's renewable energy portfolio. While much of this effort centers on the use of biomass for combined heat and power, the agency is also making headway on the use of woody biomass for biofuels. For example, in Columbia, South Carolina, the Forest Service and

the U.S. Endowment for Forests and Communities are funding Agri-Tech Producer's development of a demonstration torrefaction unit to provide various end users with wood that has been made more fuel efficient by super heating for testing in their boilers. Another pilot torrefaction project by HM3 Energy in Gresham Oregon is specifically designed to off-set coal use in electricity production. In San Francisco, California, Forest Service and the Endowment are supporting Phoenix Energy in the development of a gasification process that would generate green energy and biochar from wood.

This is a powerful and flexible suite of programs. In total, we have made many investments in renewable energy projects.

Renewable Energy and Food Costs

The farm value accounts for only about 16 cents of the retail food dollar. Transportation, processing, packaging, labor, and other costs beyond the farm gate account for the remaining 84 cents of the retail food dollar. A major factor contributing to the higher rate of food price inflation in 2011 is higher transportation costs.

Corn prices have risen sharply since last summer due largely to a smaller than expected corn crop. Drought and hot weather reduced the 2010 corn crop from an estimated 13.365 billion bushels in August 2010 to the current estimate of 12.447 billion bushels. USDA's estimate of total corn supplies (that is, production plus beginning stocks plus imports) declined by 627 million bushels (about 4.2 percent) from August 2010 to March 2011. This resulted in a 42 percent increase in the estimate of the average price paid to corn producers (from \$3.80 per

bushel in August 2010 to \$5.40 per bushel in March 2011) due to these decreases in supply coupled with small changes in corn demand. This projected increase in corn prices is similar in magnitude to the increase observed in 2008 in response to a similar set of circumstances.

In fact, world market prices for many food commodities have recently returned to the high levels seen in 2008. Among the factors that have contributed to this price run-up are the slower growth in production and more rapid growth in demand which have tightened world balances of grains and oilseeds over the last decade. Also tightening world markets are recent adverse weather conditions in some major grain and oilseed producing areas. In addition, high oil prices and the associated increased global demand for biofuel feedstocks continue. Other factors that have added to the upward pressure on global food prices include changes in currency exchange rates, growing foreign exchange holdings by major food importing countries, and policies adopted recently by some exporting and importing countries to mitigate their own food price inflation.

Higher energy and food commodity costs have led to recent acceleration in U.S. retail food inflation, but higher corn prices are just one part of the equation. In addition, while corn prices have increased substantially over the past nine months as mentioned above, previous work suggests that the effects on retail food prices are likely small. In 2010, the Consumer Price Index (CPI) for food increased by 0.8 percent and the CPI for food at home rose by 0.3 percent. These annual increases in the cost of food were the smallest in over four decades, despite continued advances in biofuels production. From 2006-10, the CPI for food at home increased by 2.6 percent per year. This annual increase in the CPI for food at home was only slightly above the annual increase of 2.5 percent during 2001-06.

USDA's Economic Research Service is currently forecasting that the CPI for food at home will increase by 3.5-4.5 percent in 2011, as retail prices for all major food categories are expected to increase. For some food products, current forecasts for increased inflation are unrelated to increasing biofuels production. For example, the CPI for fruits and vegetables is forecast to increase by 3 to 4 percent in 2011, up from 0.2 percent in 2010 and the CPI for sugar and sweets is forecast to increase by 2.5 to 3.5 percent in 2011, up from 2.2 percent in 2010. That being said, higher feed costs due to higher corn prices do play a role in projected meat price inflation with beef prices currently forecast to increase 4.5 to 5.5 percent and pork prices forecast to increase 6 to 7 percent in 2011.

USDA's efforts and success stories will certainly grow overtime. Congress has established an aggressive target in the renewable fuel standards and we are working to do our part to meet the goal of 36 billion gallons of renewable fuel by 2022. USDA programs that were discussed today support that goal. And, America's farmers, ranchers, and forest landowners are ready to meet that goal. We are honored to be here today to describe USDA's contributions to this effort and I look forward to responding to your questions.

Senate Committee on Environment and Public Works

Questions for the Record – April 13, 2011, Hearing

Senator Thomas R. Carper:

Q1: Secretary Vilsack, as you know, in Delaware, we have more chickens than people, by a margin of 300 to one. Many of our chicken farmers are concerned with the impact of corn-based ethanol on feed prices. Can you please elaborate on statements you made in your testimony that oil prices and not ethanol have been driving up the cost of corn?

A1: My comments were intended to convey that the price of corn is determined by many factors not just the volume of corn used to produce ethanol. For instance, the amount of corn and other feed crops produced in the U.S. and abroad are important factors that determine the price of corn and other grains. In 2011, world coarse grain production was down 25 million metric tons from the previous year, primarily reflecting hot, dry weather in the Western Corn Belt during July and August lowering our farmers average yield per acre by more the 7 percent from the preceding year. Other factors that determine the price of corn include the value of the dollar, which makes U.S. corn less expensive relative to corn produced elsewhere and increasing incomes abroad. Both of these factors increase the demand for U.S. corn and lead to higher corn prices.

U.S. agricultural production is also fairly energy intensive when one considers both direct energy use such as fuels and electricity and indirect energy use by way of inputs such as fertilizer, chemicals, and custom operations. As energy costs rise, so does the cost to produce the agricultural commodities, such as corn. Additional service such as processing, packaging, transportation, refrigeration, and marketing of food products also require energy. Thus, as the cost of energy/oil rises, the food costs to the consumer are also expected to rise.

Corn prices are determined by the available supply and market demand for corn regardless of whether the end use is for feed, industrial purposes, seed, export, or for biofuel. Other factors such as use of corn for feed, seed, or industrial purposes would also influence the demand for corn, thereby influencing corn prices. Additionally, a corn dry mill ethanol facility produces as a co-product (to the ethanol) about 17 pounds of high-protein distillers dried grains which is a feed ration ingredient and helps to moderate the respective prices of other feeds and feed ration ingredients.

Q2: Biofuels can benefit not only our environmental health but also the economic health of rural America. How is USDA working to ensure that the growth of the renewable fuel industry is building regional diversity and creating jobs in local communities in rural America?

A2: USDA is looking at the complete supply chain for growing the renewable fuel industry. In February 2010, the Interagency Working Group for Biofuels, which I co-chair with Department of Energy Secretary Dr. Steven Chu and Environmental Protection Agency Administrator Lisa P. Jackson, released the Growing America's Fuels report. The strategy developed within that report

included supporting the existing biofuels industry, creating new jobs and greater economic vitality in rural America and accelerating the commercial and sustainable establishment of the advanced biofuels industry by using the best skill and knowledge across many Federal departments, as well as public-private partnerships. Supporting the existing biofuels industry and accelerating the commercial and sustainable establishment of the advanced biofuels industry will enable the United States to meet the renewable fuel standard (RFS) established in the Energy Independence and Security Act of 2007 (EISA) and create new jobs and greater economic vitality in rural America.

That report also identified the need to develop a regional approach to biofuels production leveraging the unique resources available across the country. In June 2010, USDA released the USDA Biofuels Strategic Production Report which laid out a regional roadmap to meeting the biofuels goals of the renewable fuels standard (RFS2) by 2022. The report indicated that by utilizing the regional biomass production capacity of the United States, the rural sector could deliver the needed biomass to meet the RFS mandate of 21 billion gallons of advanced biofuels by 2022.

In October 2010, USDA announced the establishment of 5 regional Biomass Research Centers focused on feedstock development, sustainable production systems that integrate food, feed, fiber, forestry and fuel production, and biorefining. We also continue to provide assistance to biorefinery producers who plan on implementing advanced biofuel production technologies. There are now numerous pilot facilities in operation around the country. And, we are continuing to operate the Biomass Crop Assistance Program notwithstanding the reductions that occurred as a result of the most recent continuing resolution.

For other 2008 Farm Bill, Title IX programs, USDA is providing financial assistance to build biorefineries that produce advanced biofuels and to retrofit heating and cooling facilities that utilize biofuels. These biorefineries are located in rural areas – creating jobs, economic development and growth for those areas. The Obama administration has set a goal of installing 10,000 flexible fuel pumps nationwide within five years. USDA recently expanded the Rural Energy for America Program (REAP) to include funding for grants to retailers to help install up to 10,000 flexible fuel pumps across the country.

Q3: USDA runs programs that support both biofuels and biorefineries. Why aren't we seeing greater commercial production of advanced or cellulosic biofuels, and how long before large-scale production is available? Are there other federal programs aside from the RFS that are essential in getting the first commercial plants for advanced and cellulosic biofuels to market?

A3: To date, it appears the economic risks associated with current technologies for converting non-food biomass into liquid transportation fuels were too high to attract private capital particularly in an era of high fuel price volatility. Building the alpha plants will help alleviate these concerns. In addition, scientific research is one investment option that may narrow the uncertainties and provide investors with a reasonable expectation of return. For instance, research could reduce biofuel production costs, reduce the minimum investment capital required, enable the production of marketable byproducts, or decrease the risks of feedstock shortfalls.

A primary hurdle for commercial-scale production of advanced or cellulosic biofuels is securing project financing. Government Loan Guarantee Programs play a crucial role in helping to mitigate this risk for lenders and project developers seeking financing. USDA's Biorefinery Assistance Program has obligated over \$300 million in guaranteed loan funding to support the development and construction of five biorefineries. For fiscal year 2011, USDA will make approximately \$463 million available to support the development and construction of biorefineries.

The Department of Energy's (DOE) Biomass Program works in partnership with industry to develop, build, operate, and validate integrated biorefineries at various scales (pilot, demonstration, and commercial). DOE also offers Loan Guarantee Programs that can support the financing of advanced biofuel production.

USDA and DOE programs can complement each other by supporting these projects through various phases of technology development. For example, DOE has awarded grant funds to biorefinery projects in the pilot or demonstration phase, and USDA has subsequently provided guaranteed loan funding for this same project in the commercial-scale up phase. The USDA and DOE can also concurrently fund a biorefinery project, helping to leverage both Agency's available funding and expertise. Federal support for developing first-of-a-kind integrated biorefineries can validate cost and reduce the technical and financial risk associated with new technology development, ultimately expediting commercial-scale production of advanced biofuels.

Senator James M. Inhofe:

Q4: On April 8th, you announced a plan to install 10,000 flexible fuel pumps nationwide within 5 years. Do you have an estimate on how much this will increase corn ethanol production? What is your budget for this?

A4: Through the Rural Energy for America Program (REAP), there is \$75 million available for fiscal year 2011 to fund renewable energy systems and energy efficiency projects including, but not limited to, flexible fuel pumps. We do not have an estimate on the impact of corn-based ethanol production resulting from the installation of the flexible fuel pumps. However, we believe that providing grant and guaranteed loan financing through REAP for the installation of flexible fuel pumps will help address the access barriers to higher ethanol-blend fuels that impede the broader use of biofuels as a liquid transportation fuel in the United States. Broader use of biofuels as a liquid transportation fuel will be increasingly necessary over time to meet the renewable fuel mandates specified in the EISA. Under EISA, the volume of renewable fuel increases from 13.95 billion gallons in 2011 to 36 billion gallons in 2020 of which 21 billion gallons is advanced biofuel or renewable fuel other than ethanol derived from corn starch.

Senator BOXER. Thank you.

I have decided to ask Senator Inhofe to go first and I will close. So, we will go from Senator Inhofe to Senator Lautenberg to Senator Johanns and then I will close.

Senator INHOFE. OK. Well, thank you, Madam Chairman.

I listened carefully and I happened to tune in on a, I know this huge corn ethanol lobby that is out there. There is a program on National Public Radio I happened to hear on Sunday and they went into all of this detail arguing, refuting everything that my people in Oklahoma tell me. Because I did not have a dog in this fight. But I ended up, because of choice, objecting to even the initial mandates.

Now, I guess you are saying, you are trying to overcome the arguments that the, a high percentage of corn ethanol is not good on engines and the top one on the marine manufacturers, the small engine manufacturers, that is their No. 1 issue right now. They say that some of these engines can operate on E10 but nothing more than that, it is damaging to those even then. So I want you to respond to that.

But also, on April 8, you announced a plan to install, let us start with this one, 10,000 flexible fuel pumps nationwide within 5 years. Now, I would ask you, do you have any estimate how much this will increase corn ethanol production and what kind of budget would there be for this?

As I understand, these flexible fuel pumps give you a range, I guess the dollars are adjusted with it, all the way from clear gas to what is the highest level of, E85? Yes, E85. Well, what do you think about, if that is a possibility, the bill that I have, I am going to pull it because we will not need it anymore.

Secretary VILSACK. Well, Senator, first of all I think it is important to point out that the utilization of corn-based ethanol to meet the 36 billion gallon threshold is capped by Congress at 15 billion gallons and we are very close to getting to that cap.

It is also very clear that our attention needs to be focused on alternative sources, alternative feedstocks. We are looking at algae, woody biomass.

Senator INHOFE. Yes, I agree.

Secretary VILSACK. So, the other 21 billion gallons is going to be from sources other than corn-based ethanol. Corn-based ethanol is still going to be a viable mechanism for getting to that 36 billion gallons, but it is capped.

As far as the flexible fuel pumps are concerned, this basically provides a more convenient ethanol supply and should increase the use of renewable fuels, not necessarily corn-based ethanol, because, again, it is capped.

Senator INHOFE. But they would start with what we refer to as clear gas then on a flexible pump? Is that what you envision?

Secretary VILSACK. As I understand it, what it would be is you would have a pump that would give you the appropriate blend of ethanol. I am not sure that it would necessarily be zero blend—

Senator INHOFE. Oh, I see. OK.

Secretary VILSACK. Because of the nature of the pumping and distribution systems, it would be 10 percent ethanol, 15 percent ethanol, in some cases 20 percent ethanol, and some States have

that mandate 85 percent ethanol. It would make it more convenient to get the level of ethanol that you need for your vehicle and hopefully it would encourage the development of more flexible fuel vehicles.

Senator INHOFE. OK. If that is the case and you stated that we are near the cap anyway, what would be the objection to passing a bill, like my legislation, that does not reduce what you want to have if you want to have corn ethanol or any other type of ethanol, but merely says that you have a choice within a State if the State legislature asks you to do it so that if you want to have clear gas you can. The choice is there.

Now, if we are already close to the cap, why, what would be the argument against that?

Secretary VILSACK. Well, we still have a long way to go to meet the 36 billion gallon threshold that Congress has set. We have to figure out ways in which to produce that 21 billion gallons of different type of fuel, cellulosic—

Senator INHOFE. But right now that would have to be corn ethanol though, would it not, where technology is?

Secretary VILSACK. No. No. Right now, once we hit the 15 billion gallon threshold, we have to go to a different approach to producing renewable fuel. We have to go to cellulosic ethanol that could be using corn stover, not the kernel but the husk or the cob. It could be biofuel made from algae. It could be woody biomass. It could be landfill waste. It could be animal waste. All of those, and many other ways of producing—

Senator INHOFE. The technology is coming. I understand that. We, actually in my State of Oklahoma, we are experimenting with that. In fact, I went up to California in 2008 where they are talking about the algae and the successes already. That is all great.

I am talking about where technology is today, and even when the time comes, why would it not be a good idea to have it market-based so that if somebody like my wife, who will not put corn ethanol in her car, would not have to do it? In other words, we would have the choice.

Secretary VILSACK. Well, some States currently provide that choice, No. 1, and 87 percent of the gas that is produced today is an ethanol blend. So, I mean, consumers have made a choice. I know in my State we gave folks a choice and we see close to 80 percent of consumers opting to use ethanol and they like it for a multitude of reasons, not the least of which it helps American farmers and ranchers.

Senator INHOFE. Well, I would say, I could make the same, you are making my case for me because in my State, just the reverse is true and the farmers and ranchers' concern there is the cost of feedstock, and our cattle people, our poultry people. Anyway, that makes the case for a choice, I believe.

Senator VILSACK. Well, the other problem is whether or not the choice can be an environmentally equivalent choice, and I am not sure that that is necessarily the case with the clean—

Senator INHOFE. Well, the environmentalists support my legislation, so I do not think you ought to use that argument.

Secretary VILSACK. Well, I am deeply concerned about water quality which is what led us into this, the beginning of this conversation, many, many years ago.

Senator INHOFE. OK. Thank you, Madam Chairman.

Senator BOXER. Senator Lautenberg, I am going to ask you to go next. I am going to wait.

Senator LAUTENBERG. Thanks, Madam Chairman.

Thanks, Mr. Secretary, for your presentation. When, as you make the case, one cannot help but be sympathetic to what might develop as job loss, or opportunity, especially when the people who are growing that corn for ethanol believe that they were doing the country a favor by doing that. As it turns out, we learn as we go and it is not dissimilar from the coal dilemma where it is available, abundant, and yet it brings on terrific environmental problems.

The one thing that came up now, as a result of our discussions, a *New York Times* article yesterday said, it is entitled "High Prices Sow Seeds of Erosion" and they say long and defined erosion is once again rearing as a threat because of an aggressive push to plant on more land, changing weather patterns and inadequate enforcement of protections, scientists and environmentalists say.

So, what, where do we go from here in terms of satisfying the need for the country to have a better environmental response to its energy use and job losses? When we look at this, American taxpayers give more than \$7 billion in subsidies to biofuels every year, with most of that going to corn ethanol. Given that Federal law already mandates an increasing amount of biofuels to be used every year until 2022, what is the net gain for our taxpayers?

Secretary VILSACK. Well, Senator, 400,000 people are employed according to the Renewable Fuels Association. We found out when Congress did not continue the biodiesel tax credit that the impact of that was, for a period of time, 50 percent of the production went down immediately and, according to the National Biodiesel Board, 12,000 jobs were lost immediately.

Our view, and my view, is that I think we ought to be asking a different question about those incentives, whether or not they could be used for this maturing industry in a more effective way to grow the industry. I do not think there is any question that you all will over time, and should over time, reduce those incentives, but I think if you create a cliff, you are going to create a significant job loss in rural America at a time when we are just now beginning to turn the corner in terms of the economy. No. 1.

No. 2, you could use those incentives effectively to produce greater, more convenient supply and to encourage more flexible fuel vehicle production and purchase, which would be beneficial in terms of creating more jobs and more opportunity.

No. 3, if I can, I just want to comment on the issue of the *New York Times* article. I think the *New York Times* article failed to realize that we are investing a substantial amount of money, particularly in the Upper Mississippi River Basin, on conservation practices.

We have just announced another general sign up for the Conservation Reserve Program (CRP) and we have received a number of inquiries from farmers across the country in that program. We

are very cognizant of our need for continued commitment to conservation and you are going to continue to see a commitment.

In fact, we are also gauging the impact of that conservation. Our recent assessment in the Upper Mississippi River shows that there is a substantial commitment to conservation by producers and that it is actually reducing phosphorous and nitrogen going into our rivers and streams and, ultimately, into the Mississippi River.

So, there is a significant commitment there.

Senator LAUTENBERG. Well, I appreciate that and I believe it is well intentioned. The problem is that we are now in the State where erosion, other violations of a better environment, continues to exacerbate the problem. The question is, how do we catch up?

Mr. Secretary, one thing that ran through my mind as I was listening to you, was whether or not there ought to be a transfer of funds as we reduce these subsidies, perhaps to give farmers a chance to find other purposes for their product.

Now, with food shortages, and there are food shortages, that is demonstrated by higher prices, that may give them a chance to convert back to something that is less harmful in terms of the environment but keeps them producing for themselves and their families.

I think something like that has to be examined, whether or not we penalize the car driver now, the user, and a result of trying to keep, just looking at the focus on jobs is kind of a difficult equation and I think we have to work with it. But I do not think we can afford to stop looking for that change.

Secretary VILSACK. Senator, if I can just respond? I think you are headed in the right direction in terms of the right question to ask. Rather than trying to suggest that American farmers and ranchers are limited in their capacity, we ought to be looking for ways in which we can expand their capacity.

There is an interesting study from Michigan State and Penn State about the possibility of double cropping which would essentially create more feedstock opportunities on corn and soybean land. It would create additional income opportunities for farmers. It would be better for the environment. It would address the erosion issue, although we have seen a 69 percent reduction in soil erosion as a result of our investment in conservation programs in the Upper Mississippi River Basin.

So, I think there are ways in which we can look at a different, redesigned agricultural production system that addresses some of your concerns.

I would say that there are many reasons why there are food shortages globally, but none of them have to do with American farmers and ranchers in the sense that we continued to be extraordinarily productive. We have seen a 300 percent increase in corn production in my lifetime, a 200 percent increase in production of soybeans.

Storms, drought, floods in other parts of the world, export controls that were imposed by other countries, the currency issues, there are a multitude of reasons why we have some of the shortages that we see today in other parts of the globe.

Senator LAUTENBERG. Madam Chairman, the one thing that I think that we have to consider is having, reducing the punitive tar-

iff on imported ethanol, sugar, reduce that and let the competitive marketplace decide where they want to go, and advertise what the damage does or does not do to the environment.

Thanks very much, Mr. Secretary.

Senator BOXER. Thank you very much. Senator?

Senator JOHANNIS. Madam Chair, thank you.

Mr. Secretary, remembering the days when you and I were both Governors, the year 2000, tough, tough time in our States, we had a situation where agriculture was really, really struggling. If I remember correctly, and I am drawing this off from memory, I think the Ag subsidies in the year 2000 were like \$30 billion. It was a historic amount. Congress doubled the AMPTA and just a whole bunch of things going on.

Compare those days to the support, if you will, relative to ethanol. I would just like to get a frame of reference as to how we have reduced those subsidies over the last decade.

Secretary VILSACK. Well, we have reduced the per gallon credit, tax credit, to ethanol by a significant amount recently. In terms of overall Ag subsidies, many of them are not even being utilized, in large part because the Ag economy is healthier than it was in 2000. One of the reasons that it is healthier is, in part, because of the opportunities that biofuels and renewable fuels present.

As you well know from your days as Secretary, many farmers are required to have off farm income in order to keep the farm. Those 400,000 jobs supported by biofuels production are extraordinarily important in those rural communities. When you have the opportunity to produce another 400 or 500 biorefineries and an opportunity to use a waste product that no longer has value, that too can result for a lack of need for that safety net that it important.

We all, in a sense, benefit from that safety net. It is not just the farmers. It is all of us because we are, in a sense, self-sufficient from a food perspective in this country and we pay less for our food than most other people on this globe, which gives our citizens a lot more flexibility with their paycheck than anyplace else.

Senator JOHANNIS. Mr. Secretary, speaking specifically of food, in the USDA, studies on the price of food on an ongoing basis, primarily because the USDA is very definitely in the food business, there is always this rap against ethanol when food prices increase that, oh, it is because of ethanol.

Recently, in the Financial Times, you said something that caught my attention: "The production of corn-based ethanol does not deserve the scapegoat reputation it has too often assumed in this conversation." I would like you to explain what you mean by that. What are thinking of in terms of the relationship of ethanol to other costs in food production?

Secretary VILSACK. Well, first of all, I think it is important to recognize that, as I said, American farmers are the most productive in the world and they continue to be productive. They have embraced innovation. We are going to continue to see yields increase and continue to see production increase because of American ingenuity.

I would expect and anticipate this year you are going to see higher yields in part because of decisions that folks are making, but not necessarily resulting in any more environmental damage. No. 1.

No. 2, we did a study in 2008 when food prices went up and we asked the question, how much of this is a result of ethanol? I was surprised, and I think you might have been surprised as well, to find that when food prices went up 45 percent, one one-tenth of that increase was from ethanol.

That stands to reason when you recognize that farmers only get 16 cents of every food dollar. Eighty-four cents goes someplace else. It goes to the folks who refrigerate, package, process, truck, shelve, and all of that relates to energy costs. So, when oils go up, that is obviously a reason and a driver.

No. 3, there are a lot of reasons why, globally, we are faced with potential shortages that have nothing to do with ethanol. They have to do with drought in some parts of the world, they have to do with export controls imposed by some countries like Russia, they have to do with the fact that technology has not been embraced in some parts of the world as it has in the United States and so people are not as productive as they potentially could be. So, there are a multitude of reasons here.

But to suggest that ethanol is the reason when you have increased productivity of American farmers, when you have so little of the food dollar going to the farmer, when you have multiple reasons outside of the United States that are responsible for any shortages that might exist, it just does not, to me it is just not fair.

Senator JOHANNIS. Thank you, Mr. Secretary. Thank you, Madam Chair.

Senator BOXER. Thank you.

Mr. Secretary, you said we are nearing the 15 billion gallons? You said we are nearing the 15 billion gallons where you get the subsidy?

Secretary VILSACK. Right. We have plant capacity today, online, of roughly 14.2 billion gallons of ethanol production. We will produce somewhere in the neighborhood of 13 to 14 billion gallons this year. So, we are very close to reaching the cap.

Senator BOXER. OK. Then, under the law, what happens to that subsidy at that point?

Secretary VILSACK. What happens, I am sorry, what?

Senator BOXER. To the subsidy.

Secretary VILSACK. Well, that subsidy continues. Part of that subsidy is also encouraging cellulosic ethanol production and what we hope to be able to do with the pilot projects, with the biorefineries that we are going to provide resources to. We hope to be able to identify alternative feedstocks.

Our goal here is to have a renewable fuel industry that is operating in all parts of the country. We have programs in the Northwest looking at woody biomass. We have programs in the Southwest looking at algae. We have programs in the Southeast looking at perennial grasses and landfill waste. I mean, there is a multitude of opportunities here.

That is what is exciting about this future, that we can wean ourselves off an over-dependence on foreign oil. We can create jobs and a revitalized rural economy with this industry. This is a linchpin to really turn the situation around in rural America.

Senator BOXER. Well, the thing that I like about cellulosic is that you do not destroy food product.

Secretary VILSACK. Well, so little of the corn, in a sense it is not that we are growing corn that folks eat. The corn is obviously fed to livestock. Most of what we grow is fed to livestock. It is not——

Senator BOXER. That is important.

Secretary VILSACK. Well, it is important. But a lot of folks fail to realize the point that Senator Johanns made earlier, which is when ethanol is produced, it is not just ethanol that is produced. There are a number of co or byproducts that are produced, one of which is a distiller's dried grain that is a feed supplement that is significant, so significant that it is now also not only feeding our livestock but also is a great export opportunity for us to bring additional wealth into the country. That creates more jobs.

Senator BOXER. OK. My last question. So, when we reach this 15 billion of corn ethanol, we will then shift our focus to these other kinds of cellulosic. Is that right?

Secretary VILSACK. In a sense, we have shifted our focus in the sense that we are focusing our commitments and our time and our research on identifying feedstocks and alternatives so we can grow out this industry.

Senator BOXER. But unless there is action taken, the corn subsidy would continue?

Secretary VILSACK. Well, you have actually, I think, time limited it to this year. It expires at the end of this year. My hope is that you think not about creating a cliff but creating a glide path, phasing this out over a period of time, and, frankly, phasing out the tariff over a period of time, but utilizing those incentives to grow this industry, to make the supply more convenient with more blender pumps, to figure out ways in which we can——

Senator BOXER. What industry?

Secretary VILSACK. The renewable fuel industry, which would include cellulosic, advanced biofuels and the like.

Senator BOXER. OK, thank you.

We are going to move to our next panel and I am going to call on Senator Whitehouse to lead the questions on that panel. Because we have to move along.

We are going to call on our panel two, Hon. Gina McCarthy, Assistant Administrator for the Office of Air and Radiation, U.S. Environmental Protection Agency, and Dr. Henry Kelly, Acting Assistant Secretary for Energy Efficiency and Renewable Energy, U.S. Department of Energy.

Because of our press for time, we are going to see if you can do your statement in 4 minutes and then we will keep our questions to 4 minutes each.

So, Hon. Gina McCarthy, welcome. It is nice to see you.

STATEMENT OF GINA MCCARTHY, ASSISTANT ADMINISTRATOR, OFFICE OF AIR AND RADIATION, U.S. ENVIRONMENTAL PROTECTION AGENCY

Ms. MCCARTHY. Thank you, Senator, it is nice to see you as well. Should I begin?

Senator BOXER. Please.

Ms. MCCARTHY. OK. Chairman Boxer, Ranking Member Inhofe, members of the committee, I appreciate the opportunity to testify. I will try to be very quick.

Biomass can play an important role in reducing our dependence on foreign oil, decreasing greenhouse gas emissions and improving our rural economies.

A year ago, in compliance with the directives of the Energy Independence and Security Act, EPA finalized revisions to the national Renewable Fuels Standard Program, which we commonly call RFS.

These provisions established new annual volume standards for renewable fuels, reaching a total of 36 billion gallons in 2022. This includes a total of 21 billion gallons of advanced fuels including 16 billion gallons of cellulosic fuel, 4 billion gallons of other advanced biofuels, and a minimum of 1 billion gallons of biofuel-based diesel.

The greater volumes of biofuels required by the RFS will displace about 13.6 billion gallons of petroleum-based gasoline and diesel, about 7 percent of expected annual gasoline and diesel consumption in 2022.

EPA strongly supports expanded use of advanced biofuels, in particular, cellulosic biofuels. When Congress enacted EISA, it recognized that cellulosic targets were very aggressive. It included provisions directing EPA to reduce the mandated levels set in the statute if cellulosic ethanol production were lower than the statutory mandates. Simply put, Congress did not want us to require refiners to use more cellulosic ethanol than would be produced.

Unfortunately, the cellulosic industry did not develop as quickly as Congress anticipated and we had to lower the cellulosic ethanol mandate. For 2010 and 2011, we set cellulosic standards at about 6.5 million gallons, substantially below the EISA targets of 100 and 250 million gallons for these years.

Although EPA then had the discretion to reduce the total advanced and total renewable fuel standards, we did not do so because we fully expected sufficient volumes of other advanced biofuels would be available.

We set these standards in a transparent rulemaking process. Before we even proposed the annual standard, we conducted a thorough review of the cellulosic industry, including one-on-one discussions with each of the producers. We worked with the Department of Agriculture. We worked with the Department of Energy and the Energy Information Administration in an open and transparent process. That is how the standards are set.

We intend to propose a 2012 standard early this summer and to finalize them by the end of November 2011.

The biofuel sector is a dynamic one. We frequently hear from companies who are developing using innovative, new production techniques or different types of feedstock. We recognize the importance of evaluating and qualifying such new biofuels and, where possible, to input them as quickly as we can into the RFS Program.

Current advances in cellulosic biofuels approved for RFS include biodiesel and renewable diesel from certain feedstocks, ethanol from sugarcane, diesel and renewable diesel from algal oil, ethanol and diesel from approved cellulosic feedstocks, jet fuel and heating oil from certain feedstocks.

We also have a process that has been put in place to evaluate new biofuels and it is exciting to see that last year we approved canola-based biodiesel and we have a number of new technologies in the queue that seem very promising.

So in closing, EPA is currently working successfully to implement the RFS Program, both by following the specific direction in the statute, as well as by working with the companies to understand what technologies are available and how we can get those into market to achieve the requirements under the statute.

The program today contains several innovative elements that together provide incentives for the advanced and cellulosic biofuels sector, and we recognize that the current cellulosic production is not in line with the volumes established under EISA, but we will continue to closely monitor it and the progress of the sector, and set standards as the statute instructs.

Thank you very much.

[The prepared statement of Ms. McCarthy follows:]

GINA MCCARTHY
ASSISTANT ADMINISTRATOR
OFFICE OF AIR AND RADIATION
U.S. ENVIRONMENTAL PROTECTION AGENCY

SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

APRIL 13, 2011

Written Statement

Chairman Boxer, Ranking Member Inhofe, and members of the committee, I appreciate the opportunity to appear before you today to testify on the renewable fuel provisions of the Energy Independence and Security Act of 2007 (EISA).

On March 26, 2010, in direct response to EISA, the Environmental Protection Agency (EPA) took final action and set forth the regulations to implement revisions to the national renewable fuel standard program, commonly called the RFS. These provisions established new year-by-year specific volume standards for renewable fuel reaching a total of 36 billion gallons by 2022. This total includes 21 billion gallons of total advanced biofuels, comprised of 16 billion gallons of cellulosic biofuel, 4 billion gallons of "other" advanced biofuels, and a minimum of 1 billion gallons of biomass-based diesel, that must generally be used in transportation fuel. The revised statutory requirements also include new definitions and criteria for

both renewable fuels and the feedstocks used to produce them, including new greenhouse gas emission (GHG) thresholds. The regulatory requirements went into effect on July 1, 2010 and apply to domestic and foreign producers and importers of gasoline and diesel for renewable fuel used in the U.S.

The RFS program will provide both energy security and environmental benefits. We estimate that the use of renewable fuels to reach the 36 billion gallons mandated by 2022, relative to market projections in the absence of the mandate, will displace over 13 billion gallons of petroleum-based gasoline and diesel fuel, which represents about 7 percent of expected annual gasoline and diesel consumption; decrease oil imports by \$41.5 billion dollars; and result in additional energy security benefits of \$2.6 billion. The RFS should also reduce GHG emissions from the transportation sector by an average of 138 million metric tons of CO₂ equivalent per year when the program is fully implemented -- equivalent to annual emissions produced by 27 million vehicles.

Since the final rule was published, we have focused our efforts on successfully implementing the RFS program. This includes running the program on a day-to-day basis, but also taking steps to maximize the program's potential to encourage the development of advanced biofuels. My testimony today will outline a handful of key areas of focus.

EPA strongly supports expanded use of advanced biofuels, especially cellulosic biofuels, which under EISA must achieve at least a 60 percent reduction in

lifecycle greenhouse gases compared to the 2005 baseline average gasoline or diesel fuel that it replaces. Each year, EPA is required to publish the annual standards for total, advanced, bio-mass based diesel, and cellulosic renewable fuels. In doing so, EPA must determine the projected volume of cellulosic biofuel production for the following year, and if that number is less than the volume specified in the statute, EPA must lower the standard accordingly. Before proposing annual volume standards, we conduct a thorough review of the cellulosic industry, including one-on-one discussions with each producer to determine their individual production capacities. EPA also consults directly with the Department of Agriculture, the Energy Information Administration (EIA), and the Department of Energy's Office of Biomass, to determine the status of production capacity and capabilities of the cellulosic sector. Since these evaluations are based on evolving information about emerging segments of the biofuels industry, and may result in the applicable volumes differing from those in the statute, we propose the annual volume standard through a transparent rulemaking process, allowing for public review and comment, prior to finalizing the standards. This process ensures the most robust determination possible at the time the standards are set.

In 2010 and 2011, as a result of limited production capacity, we found it necessary to reduce the cellulosic standard to about 6.5 million gallons, substantially below the EISA targets of 100 and 250 million gallons for those years. Under the statute, when the standard for cellulosic is lowered EPA has the discretion to maintain or reduce the total advanced and total renewable fuel

standards. In 2010 and 2011, we did not reduce these standards because we expect sufficient volume of other advanced biofuels will be available.

The Agency is now evaluating production capacity for next year and we anticipate our proposal for the 2012 standards to be published early this summer, with our final determination based on comments received in response to the proposal, estimates provided by EIA, and other sources. Final RFS standards for 2012 must be in place by the end of November 2011.

Several other provisions established in the final rule are specifically intended to incentivize the expanded use of advanced and cellulosic biofuels. For instance, while EISA provides a formula by which EPA must set the price for cellulosic biofuel waiver credits that EPA makes available to obligated parties in the event the cellulosic biofuel volume is set below that required by EISA, the design of the program restricts how these credits can be used for compliance, effectively ensuring that the other advanced biofuels are indeed being used in the market.

The biofuels sector is a dynamic one, and we frequently hear from companies who are in various stages of developing fuels based on innovative new production techniques or different types of feedstocks. We recognize the importance of evaluating and qualifying such new biofuels, where possible, for use in the RFS program. We already have a strong list of qualified advanced and cellulosic biofuels approved in the current RFS, such as biodiesel and renewable diesel from certain

feedstocks; ethanol from sugarcane; biodiesel and renewable diesel from algal oil; ethanol and diesel from approved cellulosic feedstocks; and jet fuel and heating oil from certain feedstocks. We also have established a process to evaluate new biofuels for approved use in the RFS program, including analysis of GHG impacts that are based on the best available science. Last year we successfully added canola-based biodiesel as an approved pathway. We have also approved a number of other new technology based pathways. Beyond that, we have a number of additional petitions requesting evaluation of new biofuel production processes and new feedstock pathways. We are currently in the process of evaluating each of these requests, working in coordination with USDA and DOE, and are moving as quickly as practicable to complete and issue final determinations. Many of these offer potential as a qualified advanced or cellulosic biofuels.

EPA also worked closely with industry on a sophisticated enhanced data system designed to accommodate the new EISA standards. This progressive new system is referred to as the EPA Moderated Transaction system, or EMTS. This system supports real time submission of information, accounting and validation of renewable volumes, and close monitoring of many of the program requirements. Since last July, this system has helped manage transactions for billions of gallons of renewable fuels.

In closing, EPA is currently working to successfully implement the RFS program, both by following the specific direction established in EISA and by

recognizing the statute's strong intent to replace conventional petroleum-derived fuels with advanced biofuels. The program today contains several innovative elements that together help incentivize the advanced and cellulosic biofuel sector. We recognize that current cellulosic production is not in line with the volumes established in EISA, and we will continue to closely monitor the progress of this sector and set standards as instructed by the statute. Thank you for the opportunity to testify today.

Senator Inhofe

There are a number of consumers that actively seek clear gasoline and who must have no higher blend than E10 in order to avoid violating their engine warranty. What is your plan to ensure the availability of these fuels and what do you see for their future availability as RFS2 forces more ethanol on consumers?

While the Agency, after extensive review of test data, has approved the use of up to 15 volume percent ethanol in gasoline for model year 2001 and newer light-duty vehicles, it is important to remember that E15 is not required. Further, in November 2010, we proposed a program for mitigating potential misfueling with E15 when it becomes commercially available in the market, and we received several comments regarding concerns about the continued availability of E10 (and possibly E0) for the vehicles, engines and equipment not covered by the E15 partial waivers. On March 23, 2011, EPA also received a petition from 12 national associations to pursue rulemaking to ensure consumers have access to fuel blends containing no greater than 10 percent ethanol by volume. We are now in the process of completing action on the **“Regulation To Mitigate the Misfueling of Vehicles and Engines With Gasoline Containing Greater Than Ten Volume Percent Ethanol,”** and reviewing the petition. We are also committed to working with stakeholders to monitor any transition to E15, in order to identify and address any availability issues that may develop.

There are a number of non-road engines where higher blends of ethanol have not been approved (boats, lawn mowers, ATVs, snow blowers, etc.) and have the potential for serious harm to consumers. What is the agency's estimate for misfueling in the first few years of E15's existence at the gas pumps? Will you help us to understand what active measures EPA has taken, and will take, to insure that these non-road engines do not fuel up with E15.

We have taken significant steps to minimize potential misfueling with E15. First, we conditioned the partial waivers allowing E15 to be sold for use in model year 2001 and newer light-duty vehicles on E15 providers submitting a misfueling mitigation plan for approval by EPA. The plan must provide for E15 pump labeling, tracking of E15 through the supply chain, and implementation surveys of E15 content and labeling requirements. It may also include other appropriate measures to address misfueling. Second, we proposed a misfueling mitigation regulatory program to help ensure effective implementation of the misfueling mitigation waiver conditions and further reduce the potential for misfueling. The proposed rule would establish national labeling requirements, product transfer documentation and survey requirements, and a prohibition on misfueling. As noted above, commenters suggested ways the proposed program might be improved. We expect to issue the final misfueling mitigation rule this summer. We also plan to work with stakeholders on public education and outreach on E15 use and to periodically evaluate the effectiveness of the mitigation measures put in place under the waivers and final rule. Our goal and expectation is that the E15 misfueling mitigation program, like the similar program for ultra low sulfur diesel fuel, will be highly effective.

Senator Carper

Based on what you have seen from plant registrations – does the U.S. have enough domestic biodiesel production capacity to meet the biomass-based Diesel targets that are required under the second phase of the RFS program? What do you see as the role going forward with the RFS program?

There are 158 biodiesel production facilities registered for production in the U.S. RFS2 program. Collectively, these facilities have the permitted capacity to produce 2.4 billion gallons of biodiesel, which is ample capacity to meet the current EISA volume standards.

While EISA specifies the volumes of biomass-based diesel (BBD) through year 2012, it also directs EPA to establish the applicable volume of BBD for years after 2012. This standard shall be set no later than 14 months before the first year for which the applicable volume will apply. In our annual rule volume setting process for the 2012 RFS standards, we will be addressing this issue. In setting the 2013 BBD standard, EPA must take into consideration the factors specified in the statute, including consideration of biodiesel production, consumption, and infrastructure issues. The Agency will also assess the likely impact of BBD production and use in a variety of areas, including climate change, energy security, the agricultural sector, air quality, and others.

Administrator McCarthy, can you update the Committee on where EPA stands on its progress in delivering to Congress several studies on air quality, water quality and economic aspects of increasing biofuels through the RFS program?

Here is a summary of the status of two reports which address your question:

EISA Section 204 calls for EPA to report to Congress on the environmental and resource conservation impacts of increased biofuel production and use, including air and water quality, soil quality and conservation, water availability, ecosystem health and biodiversity, invasive species, and international impacts. EPA's Office of Research and Development was the lead Agency Office responsible for coordinating development of this report. A draft report, titled *"Biofuels and the Environment: First Triennial Report to Congress"* was released in January 2011 and has undergone an independent external peer review conducted by an expert panel at a public meeting on March 14, 2011. The report was also made available for general public review. The peer review and public comments are now being evaluated and the draft report is expected to be finalized and re-submitted to OMB for review in the summer of 2011.

Section 209 of EISA also requires EPA to evaluate air quality impacts associated with increased biofuel use. As part of EPA's final RFS2 rule, EPA included a preliminary evaluation of air quality impacts of the RFS2 program. EPA is using that work as a foundation for the section 209 evaluation. We plan to address section 209's requirements as part of EPA's next phase of fuel and vehicle emissions standards, known as the Tier 3 motor vehicle and fuel standard. A proposal is expected to be issued in December of 2011 which will contain a more extensive air quality impact assessment.

Senator BOXER. Thank you, so much.

Mr. Kelly, we welcome you. Acting Assistant Secretary for Energy Efficiency and Renewable Energy, Department of Energy.

STATEMENT OF HENRY KELLY, ACTING ASSISTANT SECRETARY FOR ENERGY EFFICIENCY, OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY, U.S. DEPARTMENT OF ENERGY

Mr. KELLY. Thank you, Chairman Boxer, Ranking Member Inhofe and members of the committee. I am happy to be here to discuss the Department of Energy's biofuels programs.

The transportation sector accounts for about two-thirds of the U.S.' oil consumption and contributes about one-third of the Nation's greenhouse gases. After housing, transportation is the second biggest monthly expense for American families. As the President said in his recent speech, "In an economy that relies so heavily on oil, rising prices at the pump affect everybody."

But emphasizing that "there are no quick fixes," the President outlined a series of actions which, taken together, could cut U.S. oil imports by one-third by 2025. These include programs that would increase the efficiency of vehicles as well as increase the use of new sources of fuel for the transportation sector. Home-grown biomass that can create jobs in the United States is clearly a part of the solution to this problem.

My office in the Department of Energy, the Office of Energy Efficiency and Renewable Energy, works very closely with EPA, the Department of Agriculture and other Federal organizations to accelerate the use of biomass. We do two things. One, we try to put forward programs that will accelerate the use of current biomass technologies. Then we support research and development and demonstration on the next generation of biomass technology.

We are making very rapid progress. Domestic biofuels production increased from less than 4 billion gallons a year in 2005 to nearly 13 billion gallons a year today. But there is a lot more work to be done.

We have worked closely with EPA to get the data needed to understand the potential impact of gasoline containing up to 15 percent ethanol by volume on compliance with the vehicle and emissions standards established under the Clean Air Act. Gasoline containing up to 10 percent ethanol by volume is allowed today. Using DOE and other test procedure test data, the EPA ultimately determined that E15 may be introduced into commerce for use in Model Year 2001 and newer vehicles once several other conditions are met.

DOE is also working with auto manufacturers to assess the viability of making new vehicles compatible with the higher ethanol blends, and working to ensure that fuel pumps and underground fuel storage tanks are compatible with these fuels.

But DOE is also making investments in the next generation of biofuel technology and this includes technologies that convert a variety of feedstocks, such as corn stover, wood waste and other cellulosic materials, into a variety of fuels. We are also exploring ways of converting corn and cellulose to cost-competitive, drop-in substitutes for gasoline, diesel and jet fuel.

Drop-in fuels would remove many of the barriers to commercial adoption of biomass fuels since they would be compatible with existing vehicles and delivery systems. There is substantial demand in the aviation industry for drop-in fuels and we are supporting the FAA and the commercial aviation sector in developing jet biofuels as participants in the Commercial Aviation Alternative Fuels Initiative.

DOE is supporting two main pathways to produce these advanced fuels, thermo-chemical, based on pyrolysis and gasification, and biochemical, using enzymes, fermentation and other mechanisms.

We are also working on cutting the costs of collecting, transporting and storing cellulosic materials. Algae may be a long-term strategy for biomass as well, and we are supporting programs in all of these areas using Recovery Act Funding.

Many of the research projects are rapidly leading to technologies that can be deployed at a commercial scale and we have very ambitious goals, as has been discussed, for these advanced fuels. We have a target of 21 billion gallons a year from advanced biofuels.

The President recently set a goal on breaking ground on at least four commercial scale cellulosic or advanced biorefineries over the next 2 years. The Navy has set a goal for renewable fuels to comprise 50 percent of its transportation fuels by 2020.

Senator BOXER. OK, you are going to have to wrap it up in a sentence.

Mr. KELLY. Yes. So, our 2012 budget request will buy you all of this. We think we have a good program in place and we are confident that we can meet our goals.

[The prepared statement of Mr. Kelly follows:]

STATEMENT OF

DR. HENRY KELLY

**ACTING ASSISTANT SECRETARY FOR ENERGY EFFICIENCY
OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY
U.S. DEPARTMENT OF ENERGY**

BEFORE THE

**COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE**

APRIL 13, 2011

Chairman Boxer, Ranking Member Inhofe and Members of the Committee, thank you for the opportunity to discuss the Department of Energy's biofuels program and its efforts to increase the use of domestic renewable fuels, including cellulosic and other advanced biofuels.

The transportation sector accounts for approximately two-thirds of the United States' oil consumption and contributes to one-third of the Nation's greenhouse gas emissions¹. After housing, transportation is the second biggest monthly expense for most American families². As the President said in his recent energy speech, "In an economy that relies so heavily on oil, rising prices at the pump affect everybody." Emphasizing that "there are no quick fixes," the President outlined a portfolio of actions which, taken together, could cut U.S. oil imports by a third by 2025. These include programs that would increase the fuel economy of our cars and trucks and increase the use of nonpetroleum fuels. Biofuels are a key part of the solution. Home-grown biomass can provide a cost-effective alternative to oil imports while creating business opportunities and jobs in the U.S. — including rural areas. Increased use of biomass fuels also contributes to national and economic security by insulating our economy from damaging fluctuations in international petroleum prices. And biomass use contributes to national environmental goals, helping reduce both smog and greenhouse gas emissions.

Within The Department of Energy (DOE), programs in the Office of Energy Efficiency and Renewable Energy (EERE), the Office of Science, the Advanced Research Projects Agency-Energy (ARPA-E), and the Loan Guarantee Program have all made investments in next-generation biofuels technologies. DOE also works closely with the US Department of Agriculture (USDA), the Environmental Protection Agency (EPA), the Department of Defense (DOD), the Department of Transportation's Federal Aviation Administration (DOT/FAA) and other Departments and agencies to accelerate U.S. use of biomass resources.

Our strategy for expanding the market for ethanol in the near term has several parts. First, to move toward meeting existing statutory requirements, we have worked with EPA to increase the amount of ethanol that can be sold in gasoline blends. Second, we are working to ensure that fuel dispensers and cars can use higher ethanol blends. Finally, we are engaged in a multi-faceted research strategy that has the potential to commercialize a variety of bio-based fuels derived from several different technological pathways.

My focus today will be on EERE's programs. Our work includes programs that will increase use of today's biomass fuel as well as research, development, and demonstration programs that will allow us to use a variety of different biomass feedstocks and produce a variety of fuels and other products. We are making rapid progress. Domestic biofuels production increased from less than four billion gallons per year in 2005 to nearly 13 billion gallons per year in 2010, a more than threefold increase in production in just five years³. But there's still much work to be done.

Prior to October 2010, the amount of ethanol that could be blended in gasoline for use in standard vehicle engines without modification was limited to 10 percent ethanol by volume

¹ http://www1.eere.energy.gov/vehiclesandfuels/pdfs/vehicles_fs.pdf

² <http://www.bls.gov/news.release/cesan.nr0.htm>

³ http://www1.eere.energy.gov/biomass/pdfs/biomass_mypp_november2010.pdf

(E10). DOE worked closely with EPA to provide data needed to determine the potential impact of gasoline containing up to 15% ethanol by volume (E15) on compliance with vehicle and engine emission standards established under the Clean Air Act. Using DOE and other test data EPA ultimately determined that E15 may be introduced into commerce for use in model year 2001 and newer passenger vehicles once several conditions are met. This means that EPA has approved the use of E15 for about 62 percent of the passenger vehicles on the road, vehicles that account for more than 70% of the miles driven.

DOE is also working with auto manufacturers to assess the viability of making new vehicles compatible with higher ethanol blends. DOE estimates approximately 3 percent (8 million out of approximately 240 million) of passenger vehicles on the road today are already manufactured to be compatible with blends up to 85 percent ethanol. Roughly 15 percent of new vehicle sales are also E85-compatible and domestic manufacturers have pledged to increase this fraction to 50 percent by model year 2012 (18-20 percent of total sales, including a few non-domestic models).⁴ DOE estimates that the incremental cost of manufacturing vehicles to be E85-compatible is in the range of \$50-\$100/vehicle.

Moving E15 and higher blends also requires work to ensure that fuel pumps and underground fuel storage tanks are equipped to handle these fuels. DOE is working with pump manufacturers to accelerate production of new pumps that can operate with E15 and higher ethanol blends. While pumps capable of dispensing very high ethanol blends such as E85 currently cost 1.6 times as much as conventional pumps (conventional pumps cost \$10,000-\$15,000, while E85 pumps cost about \$20,000-\$25,000) DOE analysis suggests that the cost differential could be driven down to a few hundred dollars if the high-blend pumps were manufactured in volume. DOE is working with pump manufacturers to develop and market retrofit kits to upgrade existing pumps to be compatible with E15. DOE currently estimates that modifying fuel pumps to make them compatible with E15 should also be relatively inexpensive (\$1,000 or less per pump, depending on several different pump-specific variables).⁵ In addition, DOE is working with states, which are able to use State Energy Program funds or funding from the American Recovery and Reinvestment Act of 2009, to upgrade existing fuel pumps to be compatible with higher ethanol blends. DOE will continue to work with USDA, EPA, and other agencies to facilitate these modifications, which will allow more ethanol to enter the market.

DOE is also making investments in next-generation biofuels technologies. This work focuses on technologies that can convert a variety of feedstocks – such as corn stover, wood waste, and other cellulosic materials – into a variety of fuels. We are also exploring ways of converting corn and cellulose to cost-competitive, drop-in substitutes for gasoline, diesel, and jet fuel. Drop in fuels would remove many of the barriers to the commercial adoption of biomass fuels since they would be compatible with existing vehicles and fuel delivery systems. There is substantial demand in the aviation industry for drop-in fuels, and we are supporting the FAA and commercial aviation sector with development of jet biofuels as participants in the Commercial Aviation Alternative Fuels Initiative (CAAFI).

⁴ See, for example, http://media.gm.com/content/media/us/en/news/news_detail.brand_buick.html/content/Pages/news/us/en/2011/Feb/0221_regalturbo.

⁵ Based on discussion with industry and on DOE calculations.

DOE is supporting research on two main pathways: (1) thermo-chemical conversion, based on pyrolysis or gasification, and (2) biochemical conversion using enzymes, fermentation, and other mechanisms. We are also working on cutting the cost of collecting, transporting and storing cellulosic biomass materials by exploring strategies for increasing the density of the materials and converting it to a standardized format. Algae may be an attractive long term strategy for biomass production. Several projects were supported by DOE using Recovery Act funds.

Many of the research projects are rapidly leading to technologies that can be deployed at a commercial scale. The Recovery Act accelerated investment in innovative biorefineries, providing funding for an additional 18 RD&D projects, in addition to the 11 projects previously funded in 2007 and 2008. Through these projects, DOE is helping scientists and entrepreneurs to explore technologies for converting a variety of feedstocks into ethanol and drop-in fuels. Collectively, these projects are anticipated to contribute at least 100 million gallons of advanced biofuels by 2014.⁶

The nation has ambitious goals for biomass energy through the Renewable Fuels Standards (RFS) established through the Energy Independence and Security Act of 2007 (Pub. L. No. 110-140). The RFS required the annual use of 9 billion gallons of biofuels in 2008 and expands the mandate to 36 billion gallons annually in 2022 (of which no more than 15 billion gallons can be conventional biofuels, and no less than 21 billion must be from advanced biofuels). In addition, EISA carved out specific requirements for “other advanced biofuels” and biomass-based biodiesel.

The Navy has set a goal of for renewable fuels to comprise 50 percent of its transportation fuel consumption by 2020. We are working closely with DOD to accelerate the deployment of pioneer plants that can support this ambitious goal.

The FY 2012 budget backs these goals with proposals for a well balanced research program and a reverse auction in which cellulosic and advanced biofuels project sponsors would compete for additional support.

Thank you again for the opportunity to discuss these issues, and I welcome any questions Committee Members may have.

⁶ http://www1.eere.energy.gov/biomass/pdfs/biomass_mypp_november2010.pdf

QUESTION FROM SENATOR INHOFE

Q1. Can you discuss the impact E10 and potentially higher-level blends have on non-road, small and older vehicles engines and materials durability?

A1. DOE conducted limited testing on Mid-Level Ethanol Blends in Small Non-Road Engines (SNREs). In all, 28 engines were evaluated including small generator sets, power washers, line trimmers and leaf blowers with fuels ranging from E0 to E20.

SNREs typically do not have a control system capable of adjusting for the oxygen in ethanol resulting in operation with more oxygen in the exhaust. Test results indicate engine operating temperatures generally increased with increasing ethanol content (up to E20). Other effects were increased oxides of nitrogen (NO_x), reduced hydrocarbons (HC) and reduced carbon monoxide (CO).

Engine durability and materials compatibility results for SNREs were less clear due to the limited scope of the test program. Some small engines failed on multiple fuels including E0 while other engines experienced no failures even when operating on E20. No conclusive results regarding durability could be reached. No materials compatibility issues were found but the testing was very limited in scope and duration.

DOE also conducted limited testing of 1999 model-year and newer vehicles to evaluate near-term impacts of higher ethanol blends (up to E20) on tailpipe emissions and vehicle operability. Materials compatibility was not the focus of the study but was observed. No operability or materials compatibility issues were encountered in this limited short-term study.

QUESTION FROM SENATOR CARPER

Q1. Mr. Kelly, the Department of Energy has funded several pilot and demonstration biorefinery projects that use cutting edge technologies designed to produce advanced and cellulosic biofuels. Would you please describe for the Committee some of these technologies and their development?

A1. The pilot and demonstration scale biorefinery projects being funded by the Department of Energy (DOE) will validate the technical and economic viability as well as the environmental impacts of using biomass to produce advanced biofuels and co-products. DOE's technology investment portfolio includes fermentation, gasification, pyrolysis, and hybrids with specific project examples highlighted below:

- Amyris' 1 ton per day pilot-scale biorefinery in Emeryville, CA is focused on developing US-based production capabilities for a renewable diesel fuel and petrochemical substitutes such as lubricants and polymers. The process ferments biomass derived sugars from sorghum and bagasse to produce the chemical, farnesene, that goes through additional chemical finishing to make an U.S. Environmental Protection Agency (EPA) acceptable diesel blend stock (up to 35%). The fuels will be demonstrated by FedEx fleet vehicles and, additionally, will be tested to determine if they meet the Naval MIL SPEC for F-76 criteria. Current analysis shows lifecycle CO2 reduction of greater than 100% relative to petroleum diesel.
- Clearfuel-Rentech's 20 dry ton per day pilot-scale Integrated Biorefinery project in Commerce City, CO is focused on converting wood waste and bagasse using gasification and synthetic gas-to-liquids technology to make renewable diesel and jet

fuels. The process has the potential for production of “drop-in” certified diesel and jet fuels with a greater than 80% reduction in greenhouse gas (GHG) emissions from crude oil derived diesel and jet fuel.

- UOP LLC, a Honeywell Company, is partnered with Ensyn Corporation to build and operate a 1 ton per day pilot-scale integrated biorefinery located at the Tesoro Refinery in Kapolei, HI. The biorefinery will integrate Ensyn Rapid Thermal Processing (RTP®) pyrolysis technology with UOP upgrading technology to demonstrate a feedstock-flexible process for producing “drop in” hydrocarbon fuels from biomass. Feedstock tested includes sugar cane bagasse, corn stover, guinea grass, switchgrass and algae. This process has the potential for 70-90% lower GHG emission versus gasoline.
- INEOS INP BioEnergy will construct and operate a demonstration scale biorefinery that will produce 8 million gals/yr of cellulosic ethanol and 6 MW (gross) of electricity using vegetative, yard wastes and post recycled municipal solid waste (MSW) on a site near a landfill in Indian River County, FL with a commissioning planned for the 2nd quarter of 2012. The INEOS Bio Bioenergy process combines thermochemical and biochemical processes, using four main process steps: biomass gasification, synthesis gas fermentation, ethanol recovery and renewable power generation. This process has the potential to reduce GHG emission greater than 90% versus gasoline.

QUESTION FROM SENATOR CARPER

- Q2. Mr. Kelly, can you please elaborate on what specifically DOE will be focusing on in the coming years to make sure that we meet our RFS targets on time? In moving forward, do you see DOE as strictly an R&D agency or will DOE also be involved with deploying advanced biofuels?
- A2. The Department awarded \$1 billion for 27 integrated biorefinery projects at the pilot, demonstration, and commercial scale for a combined 170 million gallons per year of advanced biofuels capacity projected to come online by 2014. Although this projected capacity is less than 10% of the current 2014 target that EISA set in the Renewable Fuels Standard (RFS), for advanced biofuels, the techno-economic analysis shows several pathways are commercially viable. However, several of the demonstration and commercial scale biorefinery projects that were selected for DOE cost-share awards cannot begin construction until they secure additional project financing beyond the DOE award. Meanwhile, these projects have been in a “pre-construction” budget period in which DOE funding supports activities such as achieving NEPA compliance, R&D (such as piloting), and engineering design. Approximately 10% of the total project costs can be expended during this “pre-construction” budget period. The remaining DOE funds are awarded conditionally; securing additional project financing to satisfy cost-share requirements has been the main hurdle to meeting these conditions.

Continued funding for integrated biorefinery projects is important in addition to R&D. DOE funding of demonstration and first-of-a-kind commercial scale plants is important for validating technical and economic feasibility before private financing can fund the build out to meet RFS levels.

Senator BOXER. Thank you.

Because I failed to call on him at the last panel, Senator Whitehouse, you start it off for us.

Senator WHITEHOUSE. Thanks very much, Chairman.

This is an exciting week for a Rhode Island company because on Friday in Shenandoah, Iowa, they will be opening a very significant bioprocess algae plant that is a, creates kind of a wonderful tableau.

It begins with the corn in the field, then goes to the old fashioned barn in which the corn is put up, and then it goes to the modern steel ethanol producing facility, and then it will go to these towers, glowing green towers that the carbon effluent from the ethanol process will be bubbled through. They have done a very good job of figuring out how the algae can be kept separate and can be encouraged to feed aggressively off of the carbon that would otherwise be out polluting our atmosphere. Then of course the algae grown successfully off it can make lipids that make oil. Off you go.

So, it is a big day for BioProcess Algae of Portsmouth, Rhode Island that has a lot of the technology behind this Iowa project. That happens all on Friday.

In the light of that, I just wanted to get your thoughts on what you thought the obstacles were to further growth in the algae fuel area and how important a landmark you felt this was.

Mr. KELLY. Well, we have supported a number of algae projects as part of our Recovery Act Funding and are optimistic that many of these projects are going to lead to cost-competitive fuels.

Algae can do two things. It can produce the cellulosic, biomass feedstock itself, but it can also be used, as I believe is the case in the Rhode Island plant, as a conversion unit so that it converts sugars into lipids that can be converted directly into fuel.

But we are trying to support a portfolio of ideas. The scientists have developed a number of different approaches, many of which are going to be, we hope, commercially competitive with today's fuel prices in the next few years.

Senator WHITEHOUSE. Good. Well, thank you very much. Friday, all eyes on Shenandoah.

Mr. KELLY. Yes. Congratulations.

Senator BOXER. All right. Very good.

Senator Inhofe.

Senator INHOFE. Well, every time we get into these discussions I always have to get on the record that if people are serious about lessening our dependence on foreign countries, the Middle East, it is very easy to do. All we have to do is exploit our own resources. As I think we have said many, many times, no one will argue with the fact that the CRS has reported that the United States has more of the reserves, recoverable reserves, in coal, gas and oil of any country. So all you have to is produce and exploit our own resources as every other country in the world does. But, having said that, let us talk about a couple of the things that are of interest.

First of all, I would agree, and I think that the Chairman and I agree on this, that we are looking to the time when we have cellulosic ethanol. It is coming. It is exciting. I have been to a lot of places where they are using it.

It is my understanding that right now, to put this in context, only 6 million gallons of cellulosic non-corn ethanol were produced last year as opposed to 13 billion gallons of corn ethanol. Is that somewhat accurate?

Mr. KELLY. Yes, I believe that is true.

Senator INHOFE. Yes. That is just amazing. Less than 1 billion. Well, anyway, that being the case, when the Secretary of Agriculture testified, and we are talking about my bill. See, I still think that is the answer. You give people an option. He said, well, 80 percent of the people in Iowa want to use corn ethanol. That is fine. If they have an opt out, they can use all, they can use all, they can use 100 percent corn ethanol. But also, in States where they do not believe that, they can use something else. That is the reason that I hope that people seriously consider that as an approach.

Now, Mr. Kelly, can you discuss the impact of E10 and potentially higher level blends have on non-road, small and older vehicle engines and materials durability? Could you?

Mr. KELLY. Well, we are, we have not done extensive testing. We have done a little testing. We have worked with EPA on the specific issue of what automobiles are compatible with E15 and the decision was made that, based on our testing, that 2001 and newer vehicles would not have any damage to the emission control system.

Senator INHOFE. We are talking about the smaller engines now. I think you know that the marine manufacturers have this as their highest goal right now is to be able to offer a choice. Do you want to comment on that, Ms. McCarthy?

Ms. MCCARTHY. The only thing I would add to what Mr. Kelly has said is to indicate to you that in our decision on E15, we tried to be very clear about where testing was adequate and where we had verified, scientifically credible data to indicate that E15 could be used.

We did raise concerns. I am not just saying that data was not readily available on those smaller engines, but also raising concerns based on our engineering assessment that there could be potential problems with E15 usage in those engines and we did not approve that for use in those engines for that reason.

Senator INHOFE. OK. Well, I want to, I would encourage you to continue with these studies so that people will be informed and can look back to the Environmental Protection Agency as their source.

Now, we have talked about E10, we have talked about E15, they are even talking about E85. I know this is something that has been discussed up in Iowa. The EPA has done some studies on this. Ethanol at 67 percent of the BTU content in gasoline, according to the EPA, and I think I am accurate on this, tell me if I am not, and I am quoting now, operating on E85 usually experience a 20 to 30 percent in miles per gallon due to ethanol's lower energy content. These results were seconded by the Consumer Report study that found E85 resulted in a 27 percent drop in fuel efficiency.

Is that accurate?

Ms. MCCARTHY. I believe that is. We have done some studies on fuel efficiency related to E85. I think Mr. Kelly has worked with us on those issues from DOE's perspective. There are tradeoffs here, and we balance those issues, and EPA is looking at, obvi-

ously, at other venues to increase fuel efficiency in vehicles. Here, we are just looking at what the impact is of different fuel usage on air quality. Certainly E85 is an allowable use. It does not create a problem for the emission systems in these vehicles, and for that reason it is allowable.

Senator INHOFE. [presiding.] Well, it is going to have to be a lot of makeup if you talking about 27 percent. Thank you.

Madam Chairwoman has gone. Who is next? Senator Merkley? Did she give me the gavel?

Let me announce here that when Senator Boxer left she gave me the gavel and I assume that is a permanent gift.

[Laughter.]

Senator INHOFE. Senator Merkley.

Senator MERKLEY. Thank you very much, Mr. Chair. Do not let go of it. Hold tight.

I wanted to followup a little bit on the corn ethanol front. In the past, it was often observed, or argued, that there was a ratio that was somewhere close to one to one in terms of the energy input and the output. I have seen recent reports and show that the industry has revolved and that has changed substantially and that perhaps the ratio of energy in, energy out is as high as 2.3 to 1.

How do you all evaluate that change in the industry and the amount of energy consumed versus that produced?

Mr. KELLY. Well, the fact is that the industry has gotten much more efficient over recent years. The one thing that has been quite controversial is that industry has to use mostly natural gas and other energy sources to produce this ethanol. So one of the most controversial issues has been whether corn ethanol reduces CO₂ production. Recent studies have shown that it does reduce CO₂ production in comparison with standard petroleum-base fuels. Not as much as cellulosic ethanol, certainly.

Senator MERKLEY. So, must my specific question is, is the ratio of 2.3 units of energy out for one energy unit in a fair assessment of the technology?

Mr. KELLY. I am going to have to get back to you on that. I do not have that number in my head right now.

[The information follows:]

The energy ratio of corn ethanol (energy in ethanol divided by the fossil energy used to produce the ethanol) has increased in recent years due to a reduction in fertilizer use per bushel of corn harvested in farms and energy use per gallon of ethanol produced in ethanol plants. According to the Greenhouse gases, Regulated Emissions, and energy use in Transportation (GREET) model developed by Argonne National Laboratories, the energy ratio in 2009 was 1.64 for corn ethanol; that is, for every Btu of fossil energy used to manufacture corn ethanol, 1.64 Btus of ethanol were produced.

Other studies that use different methods of considering ethanol co-product (namely distillers' grains and solubles [DGS], which is used for livestock feed) in their life-cycle analyses (LCAs) have yielded higher energy ratios for corn ethanol. GREET considers DGS using the displacement method (which accounts for the input energy requirement of the conventional feed product DGS displaces) while some other studies have used other methods such as process-based allocation of energy expenditure in ethanol plants (which allocate the energy and environmental burdens of ethanol plants between ethanol and DGS). A process-based allocation method, which yields somewhat higher energy ratios for corn ethanol, was used to calculate the energy ratio of 2.3.

EPA and California use the displacement method in their examination of corn ethanol life-cycle energy and environmental effects, since that is the default co-product method in the GREET model. The GREET results are documented in a recent

journal article published in "Biomass and Bioenergy" (Vol 35, Issue 5, May 2011, pages 1885–1896).

Senator MERKLEY. If you could, that would be helpful. One of the ethanol producers noted that their fuel has the lowest carbon intensity of any commercially available transportation fuel and lifecycle, looking at all the inputs and getting it to market. Does that fit, then, with the point that you were just making about carbon dioxide production, if you will, carbon dioxide footprint?

Mr. KELLY. Well, clearly we want to go toward a fuel that has extremely low carbon dioxide output namely a cellulosic fuel input and a very, very efficient conversion technology. So, we are optimistic that we have technologies, possibly including the one that you are describing, that will achieve that goal very quickly.

Senator MERKLEY. That is kind of a different answer than the question I was asking though, in terms of comparing it to our other generally available transportation fuels at this point, whether it is carbon, I recognize that we have over the horizon, and I will speak to one of those in just a moment, but in terms of the current options, is it fair to describe it as the lowest carbon footprint?

Mr. KELLY. Well, I would say of the current options, if you can go directly from a cellulosic input to a fuel, that is probably the lowest CO₂ per mile driven that you are going to get. If you can get electricity from a renewable source, an electrical vehicle would be comparable. But right now, that is not the average for electricity.

Senator MERKLEY. Ms. McCarthy.

Ms. MCCARTHY. The only thing I was going to add, Senator, is that what we are finding is that the refineries themselves are getting more and more efficient which is part of, I think, the answer to the question. It is also very exciting that we right now have a petition to qualify ethanol from algae. So, there are some really exciting ways in which you cannot only make the plants more efficient, and they are getting more efficient in terms of their CO₂ output, but looking at the upstream and full life cycle analysis as well.

Senator MERKLEY. Thank you. I certainly wanted to note that ZeaChem in Oregon expects to start limited production this fall and that is a straight from popular tree cellulosic process, with a chain of products that I believe involves vinegar, paint thinner and then ethanol. They can interrupt it to sell at the right point. But it has a dramatically substantial high ratio for energy in and energy out and very low carbon footprint.

Senator BOXER. [presiding.] Thank you.

Senator JOHANNIS.

Senator JOHANNIS. Thank you, Madam Chair. Thank you for being here.

Senator Inhofe asked you about the efficiency of ethanol versus gasoline and studies do indicate that there just simply is less gas mileage if you are burning ethanol versus burning gasoline.

But that tradeoff exists with any energy source. I mean, you can power an 18 wheeler today on electricity. You probably are not going to power an 18 wheeler on natural gas. Diesel operates differently than unleaded gasoline. Would that not be the case across the entire energy specter?

Mr. KELLY. Well, you have to be a little careful about how you state fuel efficiency. We try to use miles per gallon with gasoline equivalent to make sure that we are comparing the energy content of different fuels consistently. Because alcohol has about 60 percent of the energy density of gasoline. So that is just inherent in the product.

Now, there are ways of converting the corn with new technologies to other fuels that have a much higher energy density and we are working on those and are optimistic about them. For diesel and for aircraft, the Defense Department needs something with high energy density and a number of these products that we are developing right now and that should be available in a few years will be able to be direct drop-in replacements.

Senator JOHANNIS. Which kind of leads me to the next observation or question that I wanted to ask, and that is that I happened to be on the Cabinet when the RFS was being discussed and there was a lot of debate at what level and a lot of effort to try to understand the science and the development and glimpse into the future.

But I think at the end of the day, really what Congress was attempting to do was to send a stable signal to the marketplace that investment in the research, the development, existing plants for corn-based ethanol, was going to be supported, much like we support many industries, the oil industry, etcetera. Would you agree with that assessment?

Mr. KELLY. Well, obviously I cannot speak for the intent of Congress. But certainly the result has been to create a stable market for this new technology and we hope that we will find a way to create a stable market for the next generation of technologies that follow.

Senator JOHANNIS. What happens if the rug is just pulled out and all of a sudden it ends tomorrow, no blenders' credit, somebody is successful in altering the tariff, somebody is successful in changing the RFS. What happens to the industry, in your judgment?

Mr. KELLY. Well, we certainly want to be careful in how we make this adjustment. The President has said that he wants to work with Congress on ways of making the subsidies adapt to the current technical situation while still respecting the taxpayers.

So, we look forward to working with you to make sure that we transition to support this next generation of technology without a major disruption.

Senator JOHANNIS. Ms. McCarthy, I did not mean to ignore you. I am sorry. Is there anything in that, I have about 30 seconds left, is there anything that you wanted to offer in any of those questions?

Ms. MCCARTHY. No, Senator. The only thing I would add is that this is a very young program and the exciting thing is the number of new feedstocks that we are looking at right now. All I can tell you is that those are, those are small, growing companies that are really looking for investors and want the stability to know that we can make the decisions about their feedstocks quickly and they will have an ability to get up and running.

So, from my perspective, what they tell us is that this program is very important for their business and the innovation that they are trying to grow in our economy.

Senator JOHANNIS. Thank you, Madam Chair.

Senator BOXER. Senator Udall.

Senator UDALL. Thank you, Madam Chair.

First, I would like to thank the Department of Energy and the Department of Agriculture for the combined support of over \$100 million in grants and loans for the first integrated algae biorefinery to be constructed by Sapphire Energy in Luna County, New Mexico. We are very proud of that.

On the topic of algae, testimony from the second panel, from the Advanced Biofuels Association and DuPont, discuss how our biofuel policies, both tax incentives and Renewable Fuels Standard, treat different feedstocks differently. They indicated a technology neutral approach would be both fair and more successful.

Do you support efforts to level the playing field so that advanced biofuels qualify for the same tax incentives and treatment under the Renewable Fuels Standard regardless of feedstock?

Mr. KELLY. Well, as I said earlier, we are committed to finding ways of updating the incentive system now in place to include the variety of different products and the variety of different feedstocks and the variety of different fuels we can produce. We would be happy to work you on that.

Senator UDALL. Ms. Assistant Administrator McCarthy, can you answer that?

Ms. MCCARTHY. Senator, all I will tell you is that at this point in time we have a program up and running. We are able to look at these feedstocks. We will do whatever Congress asks us to do in terms of looking at different standards that they believe will move the most and the best products into the market as quickly as possible.

Senator UDALL. I hope that you both have the benefit of hearing the next panel and their testimony and their advocacy on that particular issue.

Assistant Administrator McCarthy, one just off-topic question. We have an air quality issue in New Mexico on the San Juan Generating Station. Apparently Region 6 EPA in Dallas is operating under a deadline to issue a Federal implement plan very soon.

The State of New Mexico's Environment Department sent a letter back in March asking for a 90-day extension so that they can finalize an alternative State implementation plan. I hope, I am not aware that EPA Region 6 has answered that letter, so I was hoping that you would keep us in the loop. I do not know if you know that right now off the top of your head.

Ms. MCCARTHY. Senator, I am familiar with that issue. I met with the folks from New Mexico and we had the Region plugged in on the phone. I probably met 2 weeks ago with them. I think that New Mexico is absolutely on the right track. They are really interested in doing their own plan. We are always interested in deferring to them. I will make sure that they have the correct signals if they did not when we met.

I do not know whether we actually need to go to a formal extension because they can do that at any time. But I will make sure that I keep abreast of that and we give them every opportunity.

Senator UDALL. Great. Thank you very much. I am sorry that I am going to miss some of the other testimony here. I have several other commitments. I appreciate your being here today. Thank you.

Senator BOXER. Thank you.

Senator BOOZMAN.

Senator BOOZMAN. Thank you, Madam Chair.

Dr. Kelly, as you know, the Energy and Independent Security Act contains a Renewable Fuels Standard that severely limits the ability for wood biomass to participate. The current definition limits biomass utilization to just 10 percent of America's forest. This is a problem for Arkansas as well as many other States which are rich in biomass.

In the past, Secretary Vilsack has noted that the definition from the 2008 Farm bill, to quote, is a common sense and practical approach that enables market participation while simultaneously considering the sustainability of our lands.

I hope that the Administration will express support for the biomass definition used in the 2008 Farm bill. Can you all comment as to where you are at on that?

Mr. KELLY. I am afraid that I am not familiar with the Farm bill. I would defer to my colleagues.

But what I can say is that we have very aggressive programs to convert wood into useful fuels and the ultimate goal here is to have something that is fully competitive on a price basis with gasoline, and of course the mark keeps changing.

But we are very optimistic that there are ways of taking forest waste products and other intentionally grown crops and converting it into diesel jet fuel and other materials that are fully competitive. That is the real home run.

We think the market will make these decisions because these will be simply the best fuels available and we are convinced we will get there certainly within this decade.

But we will certainly talk to our colleagues about that provision.

Senator BOOZMAN. OK. That would be very helpful. The other thing is, does it make any sense to have the subsidized American ethanol that is ultimately exported? How does that accomplish the goals that we are intending? Is that a wise use of taxpayer money?

Mr. KELLY. Well, as we said, these subsidies undoubtedly do need to be revisited. There has been a lot that has changed since the program was put in place. I think the producers themselves recognize that and we are working with them and would be happy to work with you on the appropriate revisions.

Senator BOOZMAN. So, do you think that is something that needs to be revisited?

Mr. KELLY. We think that, yes, the current system plainly needs to be revisited. The goal is to create jobs here in the United States as well as find energy supports for imported petroleum. We need to honor both of those objectives in whatever new program—

Senator BOOZMAN. So, do you agree that that really does not make a lot of sense?

Mr. KELLY. Well, we do try to help exporters in other areas, creating jobs here in the United States. So, I would like to discuss that with you at greater length. But the goal of job creation, particularly job creation in rural area, is the part of the program that

we should maintain. One of the things that we are hoping to do is increase U.S. exports.

Senator BOOZMAN. But that could be true of any industry. If you heavily subsidize any industry, you are going to increase the exports.

Mr. KELLY. I am not arguing that we should not revise it.

Senator BOOZMAN. That, to me, just makes no sense because the program was not set up on that basis. I mean, that does not help our energy independence at all. If we are creating an export program, then I would argue that we need to get other industries in line that could vie for the same dollars. We have all kinds of industries that are desperately in need of help for their survival.

Mr. KELLY. Oh, I completely agree. We are anxious to take all of these considerations into account if we are trying to create the right incentives.

Senator BOOZMAN. Thank you, Madam Chair. Thank you for being here. I have enjoyed the testimony.

Senator BOXER. Senator, I thought that was an interesting line of questioning because I remember once I had an amendment that would have stopped certain subsidies for Big Oil that was exploiting from Alaska. But it lost by a hair. But maybe we can team up. Because I agree with you.

Senator INHOFE. We need to talk before the team sets up.

[Laughter.]

Senator BOXER. OK, moving right along.

Senator BOOZMAN. I will team up with you and Senator Inhofe.

Senator BOXER. Oh, yes, you will protect yourself that way for sure.

[Laughter.]

Senator BOXER. Dr. Kelly, in your testimony you talked about 18 research and development demonstration projects for innovative biorefineries. Could you just give us in my remaining time, very briefly here, one or two of those that are real, live?

Mr. KELLY. Well, we are able to support something like 29 different pilot projects and commercial projects because of Recovery Act Funding. A number of those are reaching a commercial scale, they are fully ready to go forward. One of them is called BOET. They are all converting various kinds of feedstocks—

Senator BOXER. Would you describe that one that you just mentioned? POET, did you say?

Mr. KELLY. I am afraid I am going to have to get help on that one.

BOET is what feed? But what is the input?

Senator BOXER. The input?

Mr. KELLY. It is corn stover to ethanol. It is in Iowa.

Senator BOXER. What is stover?

Mr. KELLY. Corn stover is what is left over when you take the seed out. So, the good thing is, it is available with no additional inputs. It has already been produced. So, you do not have to put additional water—

Senator BOXER. Very interesting. Well, that is good.

Mr. KELLY. The reason I am confused is that there are so many different permutations and combinations that have been—

Senator BOXER. I know. I have seen a lot of these projects in my home State. It is very exciting. I mean, the potential here is just enormous and it is, as I think Hon. Gina McCarthy said, that it is slower than we would like. But it is just there, and you just know we are going to have a breakthrough and it is going to change our world. That is important.

Well, I want to thank both of you very much and call up our last panel. Michael McAdams, president of Advanced Biofuels Association, Jan Koninckx, global business director for Biofuels, DuPont, Kris Kiser, executive vice president, Outdoor Power Equipment Institute, Scott Faber, vice president, Federal Affairs, Grocery Manufacturing Association, and Mr. Brooke Coleman, executive director, Advanced Ethanol Council.

We welcome all of you. We also thank you for your patience. We are happy to start with you, Mr. McAdams, president of Advanced Biofuels Association.

Mr. MCADAMS. Madam Chairman, could I ask permission to have my full—

Senator BOXER. All of your statements will be placed in the record. If you could summarize them for us.

Mr. MCADAMS. I have a new statement. I made some changes and I wanted to have the new statement—

Senator BOXER. Absolutely, yes.

Mr. MCADAMS. Thank you, Madam Chairman.

**STATEMENT OF MICHAEL J. MCADAMS, PRESIDENT,
ADVANCED BIOFUELS ASSOCIATION**

Mr. MCADAMS. Madam Chairman, Ranking Minority Member Inhofe, members of the committee, I am honored to be here this morning to speak on behalf of the Advanced Biofuels Association, a collection of 31 of our Nation and world's top advanced biofuels and bioproducts companies.

Two years ago, the ABFA appeared before this very committee to discuss the opportunities for advanced and cellulosic biofuels. Since that time, advanced and cellulosic biofuels have seen some positive developments and some disappointments.

On the positive side, I am delighted to report to you that as a result of your work on EISA, we now have several new plants operating both in the United States and around the world which are producing advanced drop-in biofuels. These plants are making renewable fuels for the first time that can be used without changes to the transportation fleet or requiring any infrastructure changes to deliver them.

For example, Tyson Foods, in combination with Syntroleum of Oklahoma, is currently producing 75 million gallons in Louisiana of a jet fuel from animal fats and food greases. These fuels, which are being produced as we speak, are identical to those produced in refineries across America from traditional barrels of oil. The initial sales of this plant have been to the U.S. Air Force and major U.S. oil refineries.

As a result of its recent successful Initial Public Offering, Gevo has begun its plans to retrofit a traditional corn ethanol plant to produce 18 million gallons of isobutanol in June of next year. Additionally, they have announced plans to develop over 350 million

gallons of isobutanol production by 2015. If successful, this could ease some of the pressure with existing blend wall restrictions.

These developments would simply not be occurring if it were not for the vision of this committee and the Congress from 2005 to date to enact the Renewable Fuels Standard.

I urge you to reject the naysayers on advanced biofuels. They are simply not telling you the truth. The fuels are real, some are here today, and many more are on the way.

Our Association and member companies strongly believe the current RFS is the most important Federal policy in supporting for the development of the biofuels industry in this country. We would specifically urge this committee, and Congress, not to tinker with the statute at this time. Since the rules were only final last July, we strongly urge the Congress to allow the markets and the players in the market to work within the current framework and see how much progress we can make toward reaching the overarching goals of the original legislation in the short term.

As far as the specifics of the RFS, we want to compliment the EPA on bringing forward the energy density and equivalency provisions from the original RFS I program. In addition, we support the manner in which EPA has allowed the advanced biofuels mandates to continue as mandated despite shortfalls in some categories.

One concern we would call to the attention of the committee today is the overall intent of Congress to back out foreign oil with as wide a range of products as possible. This is why you expanded the statute, to include other product lines, not just gasoline.

Currently, the EPA, in their RIN certification process, is showing a tendency to be very prescriptive and narrow in allowing some of the determinations for new qualified pathways as well as qualifying some significant potential feedstocks. We would urge the Congress to stay closely engaged with the agency on these determinations. Many are moving forward at this time and could have a significant chilling effect if the existing commercial delivery chains are not approved.

We should take full advantage of the ability to back out all the various components of the market. As most of you are aware, the chief challenge of the advanced biofuels and cellulosic industry has been to achieve necessary funding to build new generation facilities. The primary reason has been the Tax Code and its lack of consistency, parity and applicability for those in a manner those companies could use it.

I thank you for the opportunity to be here with you today and I will look forward to your questions.

[The prepared statement of Mr. McAdams follows:]



Advanced
Biofuels
Association

**Committee on Environment and Public Works
United States Senate**

**Oversight Hearing on Domestic Renewable Fuels: From Ethanol to
Advanced Biofuels**

**Testimony
Michael J. McAdams
President, Advanced Biofuels Association**

April 13, 2011

Chairwoman Boxer, Ranking Member Inhofe, members of the Committee, I am honored to be here this morning to speak at this Oversight Hearing on Domestic Renewable Fuels from Ethanol to Advanced Biofuels.

I appear on behalf of the Advanced Biofuels Association (ABFA), a collection 31 of our nation's and the world's top advanced biofuels and bioproducts companies. Two years ago, the ABFA appeared before this very committee to discuss opportunities for advanced and cellulosic biofuels. This was prior to the release of the final regulatory rules for the Renewable Fuels Standard as a result of the passage of the Energy Independence and Security Act of 2007 (EISA). Since that time, advanced and cellulosic biofuels have seen some positive developments and some disappointments.

On the positive side, I am delighted to report that as a result of your work on EISA, we now have several new plants operating both in the United States and around the world that are producing advanced drop-in biofuels. These plants (Neste Oil and Tyson) are making drop in (fungible hydrocarbons or advanced molecules) renewable fuels for the first time, and can be used without changes to the transportation fleet or requiring any infrastructure changes to deliver them.

For example, Tyson foods in combination with Syntroleum of Oklahoma, is currently producing 75 million gallons a year in Louisiana of a jet fuel or renewable diesel from animal fats and food greases. These fuels, which are being produced as we speak, are identical to those produced in refineries across America from a traditional barrel of oil. Initial sales from this plant have been to the United States Air Force and major U.S. refiners.

As a result of its recent successful initial public offering (\$127 million), Gevo has begun its plans to retrofit a traditional corn ethanol plant in Minnesota to produce 18 million gallons of isobutanol in June of next year. Additionally, they have announced plans to develop over 350 million gallons of isobutanol production by 2015. This could ease some of the pressure with the existing blend wall restrictions.

In California, companies such as Amyris Biotechnologies (also successful IPO in 2010), Solazyme, and Sapphire are planning to produce a renewable diesel, jet fuel as well as renewable oils that will be converted to drop-in fuels.

Additionally, Rentech, Kior, Coskata, Sundrop Fuels, Honeywell, and LS9 are currently in the negotiating phase for loans to begin breaking ground on commercial facilities that will make significant quantities of drop-in or advanced ethanol fuels. BP and DuPont have formed a joint venture for biobutanol, which, like isobutanol, can be made by retrofitting existing corn ethanol facilities, and is fungible in all on-road vehicles and pipeline systems.

Other notable successes can be found at companies like Virent Energy of Wisconsin, whose biogasoline was recently used in a Scuderia Ferrari at the South Korea Grand Prix. Sapphire Energy of New Mexico who has had their biojet fuel used by Continental Airlines, and Rentech of Colorado which tested their renewable jet fuel with United Airlines, while last year Solazyme of California sold 20,000 gallons of their renewable jet fuel to the US Navy.

These developments would simply NOT be occurring if it were not for the vision of this Committee and the Congress from 2005 to the present in enacting a framework to expedite the development of advanced and cellulosic biofuels. I urge you to reject the naysayers on advanced biofuels. They simply are not telling you the truth. These fuels are real, some are here today, and more are on the way! They will make an immediate and significant difference to backing out foreign oil and delivering a more sustainable and environmentally friendly future.

Our Association and member companies strongly believe the current RFS is the most important federal policy in supporting the development for a biofuels industry in this country. We would specifically urge this committee and the Congress not to tinker with the statute at this time. Since the rules were only finalized last July, we strongly urge the Congress to allow the markets and the players in the market to work within the current framework

to see how much progress we make toward the overarching goals of the original legislation in the short term.

As far as specifics in the RFS rules, we want to complement the EPA on bringing forward the energy density and equivalency provisions from the original RFS 1 program. This is very important in rewarding more consumer-friendly energy dense drop-in fuels.

In addition, we support the manner in which the EPA has allowed the advanced pool mandates to continue despite shortfalls in some categories under the statute. This will help to drive more gallons in the short term using technologies that are economically competitive with the current oil prices.

One concern we would call to the attention of the committee today is the overall intent of the Congress to back out foreign oil with as wide a range of fuels products as possible. That is why you expanded the statute to include other product lines. Not simply fuels for the gasoline pool.

Currently the EPA in their RIN certification process is showing a tendency to be very prescriptive and narrow in allowing some of the determinations of new qualified pathways as well as qualifying some significant potential feedstocks. We would urge the Congress to stay closely engaged with the Agency on these determinations. Many are moving forward at this time and could have a significant chilling effect if not resolved correctly. We support the EPA's efforts to protect the environment and existing commercial deliver chains, but encourage them to err on the side of bringing as many types of renewable advanced biofuels to the market as reasonably possible. (see attached chart on the overall product slate currently used in the US). We should take full advantage of the ability to back out all the various components of the market that use foreign barrels of oil.

As most of you are aware, the chief challenge of the advanced and cellulosic industries has been acquiring the necessary funding to build the next generation of facilities. The same has been true for others would like to retrofit current first generation assets in both the ethanol and biodiesel sectors.

One of the primary reasons for the disappointing lack of commercial funding has been our biofuels tax policy. The current code is inconsistent in what it rewards according to the molecule, or feedstock or process used. Advanced and cellulosic biofuels tax policy does not provide parity and in many cases

the credit is not in the right form to enable companies to monetize their value.

Depending on your size and scale as a company, many in the advanced or cellulosic industry believe they would have been more successful if they had a similar Investment Tax Credit to the solar and wind industries rather than the production credits afforded under current law.

Producers that use algae and other second-generation biofuels companies who would specifically make a renewable gasoline support a broader application of the current cellulosic production credits or the refundable ITC provisions.

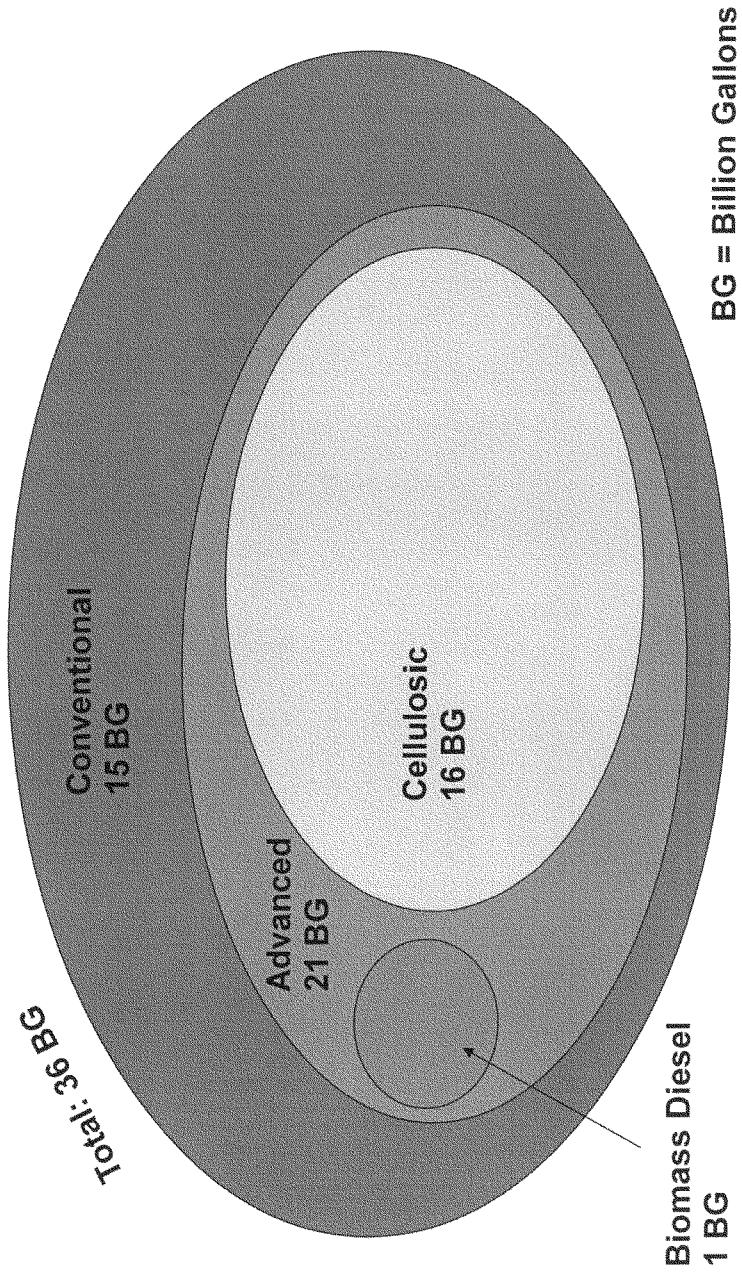
Our system of loan guarantee programs has been challenging at best. These provisions have been the subject of much controversy, and at a minimum we support the current levels of funding and would urge the Congress not to allocate money away from those funds. Many companies have already spent significant resources to apply and it would be unfair to pull the plug on the program at this time.

Lastly, on the procurement side it would be most helpful if the Congress would extend the period of time in which the military can purchase advanced and cellulosic biofuels. The current fuels markets do not have long term purchase contracts similar to the power industry. Extending contracting length would help provide a collateral event and enable commercial lenders to have confidence over a longer period of time, removing some of the risk and spurring investment.

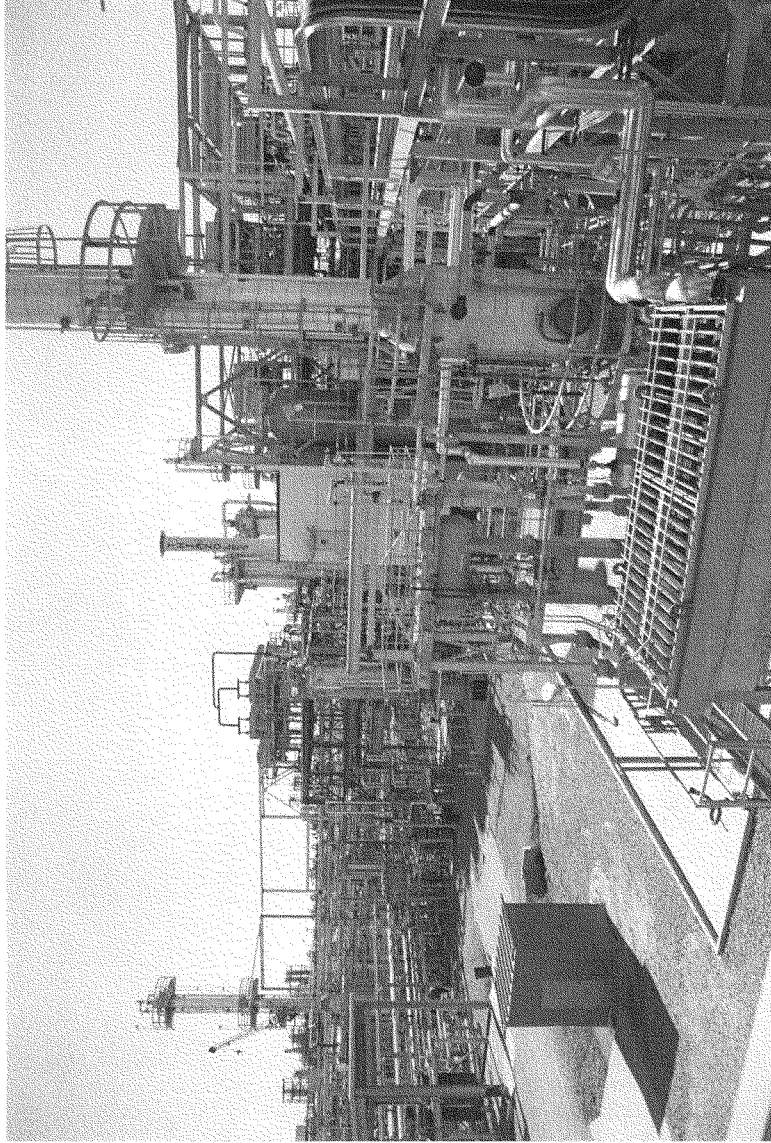
In conclusion, over the last two years a significant amount of federal funds were granted for renewable energy projects. But the startling fact is that the advanced and cellulosic sectors were given pennies on the dollar compared to other sectors which, may well be important, but will require much longer time frames to develop, deploy, and back out foreign oil. Advanced biofuels can make an immediate contribution to our nation's energy diversity and security. We would hope in the future the biofuels industry would be afforded levels of support at parity from the Administration and the Congress more in line with the electricity, and auto sector.

Thank you for the opportunity to be with you today, I look forward to your questions.

Renewable Fuel Standard RFS2



Dynamic Fuels 75 Million Gallon a Year Renewable Diesel Plant



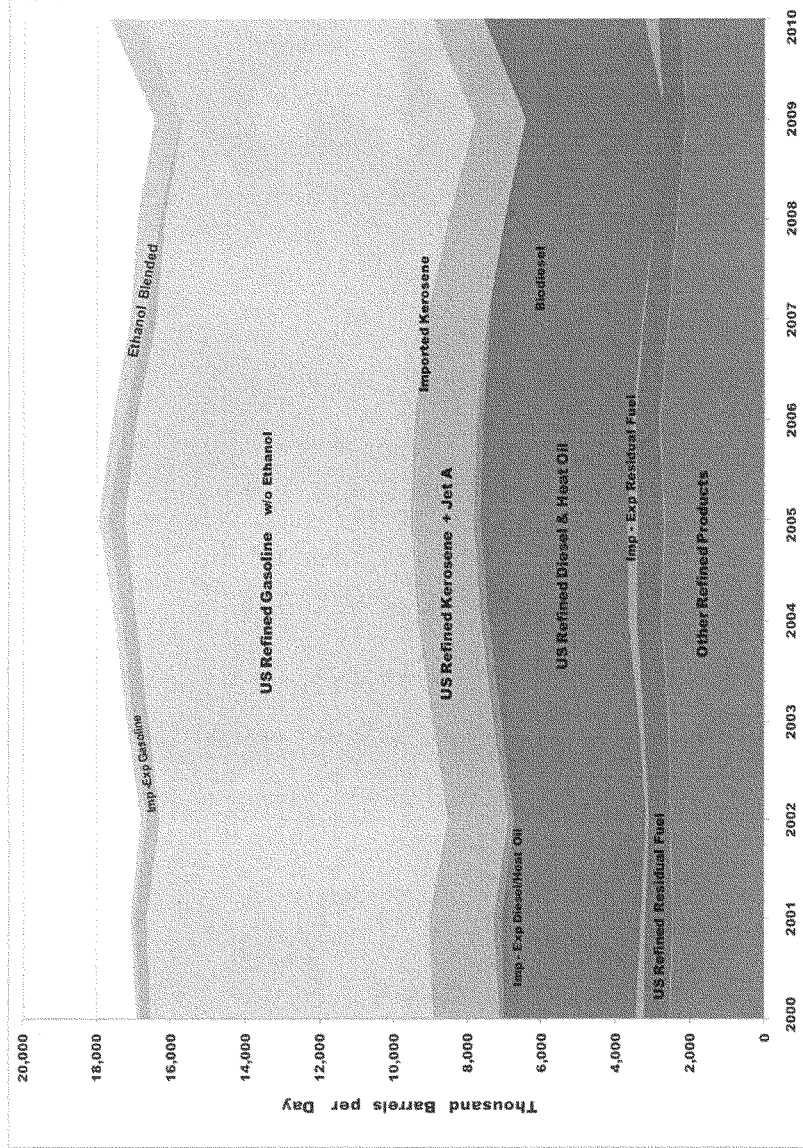
Geismar, LA

Domestic Oil Demand

Demand (1,000 bpd)	EIA data		EIA & Estimates		Projected		(Billion Gallons)
	2009	2010	2010	%	2015	2010	
USA	8990	9040		0.0	9030	138.6	
Gasoline	3631	3660		1.7	3985	56.1	
Diesel	2270	2290		1.5	2467	35.1	
On Road Transport	202	204		1.0	214	3.1	
Off Road Transport	184	185		1.0	194	2.8	
Agricultural	460	460		0.5	472	7.1	
Industry	405	406		-2.0	367	6.2	
Com & Res. Heating Oil	110	115		18.7	271	1.8	
Bunkers	522	505		-4.1	410	7.7	
Residual Fuel Oil	370	370		-5.7	276	5.7	
Bunker Fuel	1396	1410		1.0	1482	21.6	
Jet Fuel	17	18		2.1	20	0.3	
Kerosene	350	360		0.0	360	5.5	
Naphtha	927	1020		1.0	1072	15.6	
Other	1840	1910		0.8	1988	29.3	
LPG/Ethane	428	425		1.1	450	6.5	
Coke	646	660		-0.3	650	10.1	
Refinery Oils							
Total	18747	19008			19447	291.4	

Other includes petrochemical feedstocks, aviation gasoline feedstocks, still gas, misc. products

US Refined and Imported Finished Fuels and Other Refined Products



Senate Environment and Public Works Hearing

April 13, 2011

Follow-up Questions for Written Submission

Senator Carper:

1.) Many of you speak about advanced biofuels demonstration projects that are underway. Can you please shed some light on when customers might see these fuels available at the pump? What is a realistic timeframe for their coming to market on a commercial scale?

Answer: Senator, thank you for your question, if you lived in Louisiana or Indiana you would already be able to purchase these fuels today. Although there are limited gallons compared to the overall fuels pool, many advanced biofuels companies are now moving to the commercial phase of operations. Tyson Foods currently has the largest domestic facility, producing 75 million gallons of diesel and jet fuel annually. Fuels produced by Tyson and many of our other members are currently being sold to the U.S. military. In addition, our members are selling fuel to several large oil companies, who are required under the RFS2 (Renewable Fuels Standard) to have a percentage of their diesel and gasoline gallons come from renewable fuels.

Without question the RFS2 is the principle driver at the federal policy level helping to accelerate growth in the advanced and cellulosic sectors. In order to continue this momentum, the advanced and cellulosic industries need a more consistent dependable tax policy to provide capital markets with the certainty needed to spur the development of advanced biofuels. Currently we provide an investment tax credit (ITC) to other renewable industries, such as wind and solar industries, while advanced biofuels are excluded.

Given the reduction of loan guarantee programs at DOE and USDA, Congress should shift its focus to a refundable ITC. Extending the flexibility of choosing between a production tax credit and ITC to the advanced biofuels industry would positively impact many of the smaller venture funded companies seeking the funding to build their first commercial plant. These provisions were extended to the wind and solar industries in the American Recovery Act, and did a great deal to help facilitate the growth of these industries. They would have a similar effect on the advanced biofuels space.

Senator Inhofe:

1.) Senator Harkin has said that drop-in fuels won't be available for another 20 years. Are drop-in fuels, in your view, 20 years away?

Answer: Senator Inhofe, thank you for your question. Nothing could be further from the truth. In fact many drop-in fuels are being made today in both small and commercial quantities. The largest currently operating commercial plant can be found in Louisiana operated as a joint venture between Tyson Foods of Arkansas and Syntroleum of Oklahoma. This plant has a base capacity of 75 million gallons a year and is currently selling every gallon to either the U.S.

military or a domestic oil company for compliance under the renewable fuels standard. In addition, Solazyme, Amyris, Gevo are all making scalable quantities of drop in fuels today at demonstration plants and are in the process of scaling up to produce commercial quantities within in the next year. In all of these cases the fuels are fungible, meaning you do NOT need to change vehicle engines or current infrastructure to utilize them. These fuels will avoid a potential multi-billion dollar bill to taxpayers to increase the use of ethanol or other non fungible fuels in the future.

2.) Is there anything else you would like to add for the record?

Answer: The current RFS2 is the single most important policy at the federal level encouraging the development of renewable fuels. Additionally, Congress' tax code has been ad hoc and does not provide parity across all the various potential advanced and cellulosic biofuels. We would urge the Congress, should it choose to restructure the code, to address these issues in a technology neutral approach. It makes a great deal more sense to focus our limited resources on commercializing a wide variety of advanced technologies, rather than continuing to put all our eggs in one basket and support one type of renewable fuel at the disadvantage of all others.

Senator BOXER. Thank you so much.

Mr. Jan Koninckx, global business director for Biofuels, DuPont.

STATEMENT OF JAN KONINCKX, GLOBAL BUSINESS DIRECTOR, BIOFUELS, DUPONT APPLIED BIOSCIENCES, E.I. DUPONT DE NEMOURS AND COMPANY, INC.

Mr. KONINCKX. Good morning Chairman Boxer, Ranking Member Inhofe and members of the committee.

I am Global Business Director for Biofuels at DuPont. In my testimony, I will provide our views on the future of biofuels and the role of the Renewable Fuels Standard in that future.

I have two key messages for you. First, advanced biofuels are a technological reality. They will soon be a commercial reality. Second, the single most important thing that Congress can do for advanced biofuels is to provide a stable policy environment. Keep the RFS and advanced biofuels tax policies as they are. We simply ask that you do no harm. With a stable policy and access to the fuel pool, we will succeed.

DuPont brings a uniquely broad perspective to bear on biofuels issues. Our seed business, Pioneer Hi-Bred, has enabled steadily rising production per acre for over 80 years. We have 208 years of demonstrated commercialization success of technical innovation and manufacturing expertise. We bring significant biotechnology, process engineering, plant operations and agricultural to bear to this endeavor.

When the U.S. Government called on the private sector to step forward in advanced biofuels technologies and production, we responded with 10 years of work, hundreds of millions of R&D dollars and investment dollars, and our brightest minds. We are confident of our capabilities to cost-effectively produce advanced biofuels.

What have we done? What are we working on? First, with our partner, BP, we have developed and demonstrated biobutanol, a higher alcohol with excellent fuel properties. We are on track to commercialize this in the United States by 2013. This drop-in fuel is the first biofuel specifically developed for its fuel performance characteristics in that it behaves very similarly to gasoline.

Second, our other biofuel joint venture, DuPont Danisco Cellulosic Ethanol, will shortly announce the construction of a commercial-scale cellulosic ethanol facility based on corn stover, with production, again, in the 2013 timeframe. We are currently demonstrating this technology on corn stover and on the energy crop switchgrass, providing the opportunity to produce biofuels both inside and well outside of the Midwest.

We recognize a variety of ramifications of our dependence on oil. They are becoming more acute. Biofuels are making solid progress in that problem. Biofuels' production in the United States offsets about 10 billion gallons of petroleum each year, 10 billion of very expensive gallons that we do not have to import. That alternative fuel supply has been built by the first generation corn grain ethanol industry.

The RFS has helped now to move the biofuels market in the direction of multiple feedstocks and production technologies as well as desirable fuel attributes. There are multiple technology devel-

operators preparing to produce cellulosic ethanol, biobutanol and other drop-in fuels in demonstration or commercial quantities over the next 24 months. The economics and carbon performance of grain ethanol continues to improve, agriculture productivity is strong, remains strong, and will grow.

These trends suggest that while the RFS targets are aggressive, as they should be, they are not out of reach. Advanced biofuels are delayed versus the annual RFS targets, but we are confident that they are on track to meet the overall goals. EPA has all the authority it needs to adjust annual targets on the way to meeting the overall goal.

The RFS does not need to, nor should it be, reopened. In fact, reopening the RFS would seriously undermine the market predictability that is allowing us to move forward with significant investments in these businesses.

I thank you for the opportunity to speak with you today on this important topic. I have tried to illustrate in my remarks biofuels technologies are demonstrated and implementable. We are poised to see commercial-scale production from multiple companies producing various fuels just as it should in a competitive market. We are confident that several of these technologies will prove out at commercial scale.

Congress has done an effective job of creating a policy framework that has allowed this to happen, especially the RFS. Your job now is simply to maintain that policy so that we have the predictability to move forward.

Thank you. I look forward to your questions.

[The prepared statement of Mr. Koninckx follows:]

**Statement of Jan Koninckx
Global Business Director, Biofuels
DuPont Applied BioSciences
E.I. DuPont de Nemours and Company, Inc
Regarding Domestic Renewable Fuels
before the
Committee on Environment and Public Works
U.S. Senate
April 13, 2011**

Good morning Chairman Boxer, ranking member Inhofe and members of the committee. My name is Jan Koninckx and I am the Global Business Director for Biofuels for DuPont Applied Biosciences, which includes our biofuels and biomaterials businesses. I am pleased to be here today to discuss the bright future for renewable fuels in the US. In my testimony I will provide our views of the future of biofuels, and the role of the Renewable Fuels Standard in that future.

I have two key messages for you today. First, advanced biofuels are a technological and economic reality. They are about to become a commercial reality. Second, the single most important thing that Congress can do to ensure this reality is to provide a stable policy environment – keep the RFS and advanced biofuels tax policies as they are. We simply ask that you do no harm. With stable policy and access to the fuel pool we will succeed.

DuPont brings a uniquely broad perspective to bear on biofuels issues. We span the biofuels value chain. Our seed business Pioneer Hi-Bred is the world's largest seller of seed corn and the second largest seller of soybean seed to farmers. Our seeds have enabled steadily rising yields, or production per acre, with declining inputs such as pest control and fertilizer, for over 80 years. We sell over 250 corn varieties specifically for ethanol production, varieties that produce high levels of fermentable starch, yielding more gallons of ethanol per acre. As a company with a 208 year history of technical innovation and manufacturing expertise we are also a developer of advanced biofuels technologies. These are not interesting lab scale experiments – these are businesses. We are operating in the US, South America, the EU and Asia as demand for biofuels grows globally. We bring significant biotechnology, process engineering, plant operations and agricultural experience to this endeavor. Our world class partners bring significant expertise on enzymes and fuel markets. Several Congresses and Administrations have called on the private sector to step forward and advance biofuels technologies and production. We have responded with almost ten years of work, hundreds of millions of dollars of R&D and investment and some of our brightest minds. We are very confident of our capabilities to cost effectively produce advanced biofuels. Once we demonstrate production at commercial scale we will license these technologies to biofuels companies, providing expanded economic opportunities for current growers and producers and speeding the rate of advanced biofuels production.

We have already demonstrated our ability to succeed in turning biological feedstocks into value adding products. Our first venture in industrial biotechnology was the specialty chemical propanediol, or PDO, traditionally made from hydrocarbons. We developed a technology to produce bio-PDO through fermentation, for which we received the President's Green Chemistry award. We built a production plant in Loudon, Tennessee, which we have subsequently expanded due to growing market demand. We are successfully selling bio-PDO into multiple end use markets, including our Sorona bio-based polymer that is going into applications as varied as Mohawk Smartstrand® brand carpeting, sportswear and auto parts.

With our partner BP we have developed and extensively tested bio-butanol, a higher alcohol fuel produced by fermenting biomass. Biobutanol has excellent fuel properties, with higher energy density than ethanol and the ability to be distributed via the existing gasoline infrastructure, including pipelines. Biobutanol also improves ethanol-gasoline blends as a co-blending component. It reduces the volatility of the blend, allowing butanol-ethanol-gasoline blends to be used in the summer season where air quality concerns currently limit the use of ethanol-gasoline blends. Because butanol has less affinity for water and is a weaker solvent than ethanol it will be more compatible with existing equipment, including small engines. We are on track for commercial scale production of biobutanol in the US by 2013-2014. Our joint venture company DuPont Danisco Cellulosic Ethanol (DDCE) will shortly announce the construction of a commercial scale cellulosic ethanol facility based on corn stover, with production in 2013-2014. This demonstrated technology, operating today in Vonore, Tennessee, will quickly provide expanded ethanol production from the existing agricultural and biorefinery infrastructure employing non-food feedstocks such as corn stover and switchgrass.

The existing suite of biofuels policies, of which the RFS is a significant component, has been very successful in standing up a US biofuels industry that is making a meaningful contribution to US energy security and reducing the environmental footprint of transportation. We have to remember that we started down the road of alternative transportation fuels because of the variety of security, environmental and economic ramifications of our dependence on petroleum. Those challenges have only grown more acute. And we are making solid progress. Today, biofuels production in the US offsets over 10 billion gallons of petroleum demand each year. Ten billion gallons is a significant amount of very expensive petroleum we did not have to import. That alternative fuels supply has been built by the first generation grain ethanol industry. Future growth in biofuels supply will now come largely from non-food related feedstocks.

The Role of Biofuels

We believe that biofuels can serve an expanded role in fueling transportation in the US and elsewhere while contributing to reducing the carbon intensity of transportation. We also believe this can be done in a very sustainable manner, without increasing the environmental footprint of the agricultural enterprise. Steadily increasing agricultural

productivity, which our seeds are helping to achieve, and the use of non-food feedstocks, such as cellulose, to produce biofuels are important to this future. Ensuring a viable biofuels market will be critical to the substantial private sector investments that are occurring to bring these second generation biofuels technologies to market. The RFS provides the policy framework that is needed. It is important that it remain stable.

Why are we bullish on biofuels? First, because we see agricultural productivity as an engine that can provide abundant food, feed, fuel and materials globally. And second, because we see the promise of next generation biofuels technologies to expand upon the solid foundation we have built on grain based ethanol. Our DuPont/BP joint venture Butamax will be producing biobutanol at commercial scale in 2013-14. The first generation of butanol production will come from modifying current grain ethanol facilities to produce this higher value fuel under technology licensing, which will not change corn supply demand dynamics. Future production will come from additional feedstocks including cellulose. Butanol is a proven high value fuel. We have already performed more than 1.5 million miles of detailed fleet testing and 80 million miles of on-road testing involving 250,000 tank fills across multiple automobile brands, model years and engine configurations, as well as extensive engine and infrastructure testing. In that testing we have evaluated engine performance and vehicle emissions and demonstrated that biobutanol is a clean, effective motor fuel. We are on track to soon bring to market a biofuel that is completely compatible with the existing petroleum infrastructure, has high energy density and thus good fuel mileage, and improves ethanol-gasoline blends. This “drop-in” fuel is the first biofuels specifically developed for its fuel performance characteristics. This year our joint venture with Danisco, DDCE, will announce the location of its first full scale commercial plant to produce ethanol from corn stover, which is the cob, stalk and leaves of the corn plant, with commercial production in 2013-14. This fuel will have a carbon improvement over gasoline on the order of 80 to 90%.

Why corn stover? Because it capitalizes on the existing infrastructure to provide rapid expansion in ethanol production from non-food feedstocks. Existing farming equipment will harvest an appropriate amount of stover, leaving behind enough for soil conditioning and erosion control. The stover will be transported to a cellulosic conversion unit associated with an existing biorefinery where it will be fed to a parallel processing and fermentation unit integrated with the existing facility. The result will be a 20-25% increase in ethanol production from the existing acreage, providing expanded economic opportunity to current farmers and ethanol producers. The stover from fields that are currently producing corn for food and feed uses will be able to produce additional biofuels volumes, further expanding the ability of agriculture to produce food, feed and fuel. We are also demonstrating this technology on the energy crop switchgrass, providing the opportunity to produce biofuels well outside the Midwest.

An important element of advanced biofuels is securing a high quality, cost-effective feedstock supply for commercial biorefineries. We have been working closely with growers, harvest experts, and universities on two groundbreaking feedstock projects. In Tennessee, through a farm-to-fuel program jointly funded by the state and by our joint

venture DDCE, we have built an operating demonstration scale biorefinery to take advantage of nearly 6,000 acres of switchgrass cultivation created through the joint efforts of local farmers, the University of Tennessee and Genera Energy. Farmers are scaling up that acreage. In the Midwest we have been working closely with growers and with Iowa State University on a comprehensive program to cultivate, transport and store corn stover. Through this program we have developed a viable business model for stover to supply the commercial scale biorefinery we are planning to build in Iowa. It is a program that ensures our feedstock supply and creates additional economic opportunity for growers in those farming communities.

The RFS

Now let me turn my attention to some of the specifics of the Renewable Fuels Standard. As the RFS was developed we encouraged Congress to emphasize policies that were feedstock, technology and fuel type neutral, and to focus on desired fuel attributes such as energy density, low carbon content and infrastructure compatibility. The RFS II provisions made positive steps in this direction, and are helping to motivate the right kinds of market transitions. There are multiple technology developers preparing to produce cellulosic ethanol in demonstration or commercial quantities from a range of feedstocks over the next 24 months. Both our joint venture Butamax and at least one competitor will produce commercial quantities of biobutanol in the same time frame, and multiple companies are working on other “drop-in” fuels. The economics and carbon performance of grain ethanol continues to improve as well, as does agricultural productivity and sustainability in the US. These trends suggest that while the RFS targets are aggressive, as they should be, they are not out of reach. Advanced biofuels are slightly delayed versus the annual RFS targets, but we are confident they are on track to meet the overall goals. EPA has all of the authority it needs to adjust annual targets on the way to meeting the overall goal. The RFS does not need to be, nor should it be, reopened to allow this market to develop properly. In fact, reopening the RFS would seriously undermine the market predictability that is allowing us to move forward with significant investments in these businesses. The integrated strategy of the U.S. is exemplified by the RFS and the related investment strategies of US DOE and USDA, which have supported a variety of alternative fuels technologies. As a result, numerous companies and institutions are now involved in biofuels work looking at a variety of different technologies, approaches, and feedstocks, and we can confidently look to US-derived technology to make the seminal contributions to renewable fuels.

The Role of Agricultural Productivity in Biofuels

Agricultural productivity plays a significant role in biofuels as well. The US has a long track record of continually expanding production from the existing agricultural acreage, and producing a wide variety of products for food, feed, fuel, and industrial uses. At the turn of the 20th century, 25% of all energy used in the US came from burning wood, and in 1915, some 90 million acres of US cropland were used to grow feed for horses and mules – our transportation at that time. A major innovation of the last century was to learn to use fossil fuel based sources for our transportation, energy, and material needs.

While hugely transformational for the world's economy, limitations of our dependency on fossil fuels are increasingly apparent. Concurrently with the huge transition to this fossil based economy, agricultural productivity also increased by leaps and bounds. When our Pioneer subsidiary began operations in 1926, corn yields were about 27 bushels per acre and petroleum was relatively cheap – you could buy 3.5 pounds of petroleum for the cost of one pound of corn. Today, corn yields in the US average about 165 bushels per acre and many farmers see over 200 bushels per acre – and yields continue to increase. Corn, at \$7/bushel, is some 3.5 times cheaper than petroleum, instead of being 3.5 times more expensive as it was in 1926 – a remarkable testament to agricultural productivity. And we have yet to fully apply this proven development process to cellulosic feedstocks such as switchgrass, where we anticipate similar progress.

Thank you for the opportunity to speak with you today on this important topic. As I have tried to illustrate in my remarks, biofuels technologies are demonstrated and implementable. We are poised to see commercial scale production from multiple companies producing various fuels – just as it should be in a competitive market. We are confident that several of these technologies will prove out at commercial scale. Congress has done an effective job of creating a policy framework that has allowed this to happen – especially the RFS. Your job now is simply to maintain that policy so that we have the predictability to move forward. Thank you, and I look forward to your questions.

**Senate Committee on Environment and Public Works
Oversight Hearing
“Domestic Renewable Fuels: From Ethanol to Advanced Biofuels”
April 13, 2011**

Answers to Follow-Up Questions for Dr. Jan Koninckx, DuPont

- 1. Many of you speak about advanced biofuels demonstration projects that are underway. Can you please shed some light on when customers might see these fuels available at the pump? What is a realistic timeframe for their coming to market on a commercial scale?**
 - Our joint venture DDCE has a demonstration facility in Vonore, TN, which started up in December 2009. It has a capacity 250,000 gallons/year, and is designed to test and run multiple feedstocks (corn cob, stover, switchgrass).
 - Our biobutanol joint venture has built a demonstration facility in the UK, which is in the process of being brought on line.
 - Furthermore, both JVs are in negotiations to select sites for their first commercial size plants in the US, with production expected in the 2013-2014 timeframe.
 - Once these first commercial plants are underway, we intent to make our technology available to others through licensing, thereby enabling a more rapid rate of capacity build in US advanced biofuel production around 2015.

- 2. Dr. Koninckx, in your testimony you say that changes to the RFS program could undermine pending investments in advanced biofuels. Can you please elaborate on that?**
 - Establishing and commercializing a new biofuel technology is a massive undertaking. Government support can mitigate the risk inherent in new technologies which require huge investments, long time horizons, and are therefore extremely difficult for any company to undertake in isolation.
 - Sudden change or uncertainty in a policy platform is counterproductive and discourages innovators, entrepreneurs, and potential partners at a critical time in the advanced biofuels industry development.
 - The RFS provides a clear, long-term signal to everyone involved in the biofuels value chain (farmers, technology providers, engineering and procurement contractors, refiners, financial backers, etc.) that there will be a strong, reliable biofuels market in the US which justifies the decision to take a risk and invest today.

- Reopening the RFS would seriously undermine the market predictability that is allowing us to move forward with significant investments in these businesses. DuPont alone plans to invest about \$200 million per year through 2015 as part of our advanced biofuels commercialization efforts.

3. In your view, how long before we see large-scale production of cellulosic biofuels and production of biobutanol?

- Our joint venture DDCE has a demonstration facility in Vonore, TN, which started up in December 2009. It has a capacity 250,000 gallons/year, and is designed to test and run multiple feedstocks (corn cob, stover, switchgrass).
- DDCE's first commercial size facility will be built in Iowa starting later this year, for production of cellulosic ethanol from corn stover. The plant will have a capacity of 25 million gallons per year, and will be in operation by the end of 2013.
- With respect to biobutanol, we are currently focused on making the demonstration facility (in the UK) fully operational, and on identifying potential sites in the US for the first commercial plant location.
- Our Butamax™ joint venture is currently in negotiations with several companies and locations in the US for the purpose of identifying a corn ethanol plant suitable for conversion to biobutanol production. Target plants have an average ethanol capacity of 100 million gallons, with biobutanol production to begin by 2013-14.
- In the meantime, we have achieved several key biobutanol milestones, including technology demonstration, key patents granted, and more than 1.5 million real vehicle-miles driven on 16% butanol blends.
- Once these first commercial plants are underway, we intent to make our technology available to others through licensing, thereby enabling a more rapid rate of capacity build in US advanced biofuel production around 2015.

4. DuPont has a robust program of producing biobased polymers. How do you see bioproducts such as bioplastics and renewable chemicals helping to make biofuels more cost competitive and more commercial-ready?

- DuPont has proven our ability to bring new, advanced, bio-based technology to market, with commercial products available today.
- Our first project developed a technology to produce the specialty chemical propanediol, or PDO, through fermentation of renewable feedstocks. This technology received the 2003 EPA Presidential Green Chemistry Award.

- In 2004, we announced the formation of DuPont Tate & Lyle BioProducts LLC, a joint venture to manufacture and market Bio-PDO™. The JV built one of the largest bio-materials processing facilities in the world in Loudon, Tennessee, and had its first commercial shipments in 2006. By 2010, due to increasing market demand, we announced the plant's 100 million pounds/year capacity would be expanded by 35%.
- We are successfully selling bio-PDO into multiple end use markets, including our Sorona® bio-based polymer that is going into applications as varied as Mohawk Smartstrand® brand carpeting, sportswear and auto parts.
- In April 2011, DuPont™ Sorona® renewably sourced fiber became one of the first 11 products approved to use the United States Department of Agriculture (USDA) new product label on certified biobased products.
- DuPont has the ability to bring together technology, process engineering, manufacturing expertise, and complementary partnerships -- as evidenced by our BioBased Materials experience. This provides a solid foundation for transferring advanced biofuels technology from the current demonstration plants to full commercial scale, by optimizing the production process and reducing costs to a competitive level.

Senator BOXER. Thank you very much.

Mr. Kiser, executive vice president, Outdoor Power Equipment Institute.

**STATEMENT OF KRIS KISER, EXECUTIVE VICE PRESIDENT,
THE OUTDOOR POWER EQUIPMENT INSTITUTE**

Mr. KISER. Thank you, Chairman Boxer and members.

Our 80 member companies make small engines and put them on vehicles and products. These are working machines. Typically, when one of our machines operates, someone is doing a job.

We have some 200 million units in use today throughout the United States. Their uses are too numerous to mention. We have 900 engine families that are regulated by the EPA and California Air Resources Board for emissions. A transition to any new fuel presents a challenge to us.

Our members understand and appreciate the work Congress has done on reducing our dependence on foreign oil and energy dependence in the use of biofuels. We support that.

Our members make a wide range of product, diesel electric hybrids, propane, compressed natural gas, battery, electric, etcetera. Moving to a different gasoline-based fuel presents an enormous challenge for our industry. None of our product, none of engines, none of our product, no marine product, no ATV, not snowmobile, etcetera is designed, built or warranted to run on any gasoline fuel containing more than 10 percent ethanol.

The EPA did not make a sub sim declaration on E-15. They did not approve its use for any of our products. A sub sim declaration is a substantially similar. What they are saying is, this is a different fuel.

We are not anti-ethanol. Our members can design a product to run on anything. We can design a product to run on E-10, E-20, E-30. It does not matter. The products we have designed and built and put into the marketplace were not designed for E-15.

EPA has approved E-15 for use in model 2001 and newer automobiles. Again, it has not approved it for our use. But they are going to move that fuel into the marketplace. How are you going to put it into the marketplace? For 50 years you have been able to drive to a gasoline station and what goes in the car goes in the can. What goes in the can goes in the bass boat, lawn mower, ATV, snow machine, et cetera. You are changing that paradigm.

It is especially true for seasonal uses. When you add alcohol to a petroleum-based product, you change the fuel. You destabilize the fuel. So, if a product is seasonal use, like a boat, landscapers' equipment, consumers need to know about its storage, that storage capabilities have changed. The marine environment is particularly challenged. Ethanol absorbs water. Once it absorbs enough water, it phase separates and the product fails.

The EPA has said they are going to put a label on E-15 at the pump, at retail. This is to educate the consumers about its use, what to put it in, not to put it in. We are concerned that a label is inadequate to provide this knowledge to the user.

DOE did test our equipment. We have 900 engine families regulated. They tested 28 engines in four families. We do not disagree with their findings. What they found was it gives you increased

heat, performance irregularities, failure and unintentional clutch engagement. Unintentional clutch engagement is a fancy word for saying the blades engage when the machines are in neutral. This is a problem. Failure is a problem.

Again, we are not opposed to ethanol. But what we are opposed to is bringing this fuel to the marketplace in a way that does not put our users' economic interests or safety at risk. We would encourage those in the ethanol industry to work cooperatively to find a way to bring this fuel to the marketplace that does not place people at risk.

Secretary Vilsack talked about blender pumps into the marketplace. That allows you, or any user, to choose your level of ethanol. It may be cheaper. It is less energy dense. You might be incentivized to purchase E-30 for all of your products. You might legally fuel your flex fuel product but illegally fuel everything else.

Ethanol damage is permanent. It is irreversible. If you are a landscape operator and you destroy all of your equipment, you have hurt your business.

We want to work with Congress and believe the partial waiver is a challenge where they have approved it for a subset of the auto fleet. All engine makers, autos, and ourselves, and the marine industry and others are challenging that in court.

As that works its way through the system, we would like to work with Congress in finding meaningful alternatives to bring biofuels to market.

Thank you.

[The prepared statement of Mr. Kiser follows:]

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STATEMENT
OF
THE OUTDOOR POWER EQUIPMENT INSTITUTE

BEFORE THE:
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

U.S. SENATE

APRIL 13, 2011

PRESENTED BY

MR. KRIS KISER
EXECUTIVE VICE PRESIDENT

Good morning Chairman Boxer, Ranking Member Inhofe and members of the Committee. Thank you for the opportunity to appear.

I. BACKGROUND

My name is Kris Kiser and I am Executive Vice President of the Outdoor Power Equipment Institute. OPEI is an international trade association representing eighty member companies that manufacture forestry, utility, landscape and lawn and garden equipment. Our manufacturers produce billions of dollars of product in the US and enjoy a positive trade surplus exporting worldwide.

Our members have some 200 million legacy products in use today in every corner of the United States. Millions of foresters, landscapers, contractors, tradesman, firemen, small businesses, states and municipalities, park departments, farmers and everyday homeowners use our machines every day.

These are working machines. Their safe and reliable operation (and their emissions compliance) is critical to their users and to us.

Portable power generators provide power to work sites for electricians, plumbers, carpenters, farmers, emergency workers and any other business whenever and wherever needed. Chainsaws, chippers, grinders, pruners, and splitters empower the forest products industry. Additionally, chainsaws are used by emergency utility crews and found in every firehouse in the country alongside small engine “jaws of life.” Ninety thousand landscape businesses use our lawn and garden power products as do city, state and federal governments who manage our parks, forests, green spaces and the 50 million acres of turfgrass in the US. Our utility vehicles are ubiquitous in any hauling endeavor. Small engines power water wells, irrigation systems, myriad equipment and their uses and applications are too many to list. Open a homeowner’s garage and we’ll likely be there.

These products are among those in the 900 engine families represented by OPEI and regulated by the US EPA and the California Air Resources Board for emission and evaporative standards. The certification fuel used for establishing emission compliance is dictated by the regulatory authorities.

II. POLICY OVERVIEW

Our members understand and appreciate the work Congress has done on energy independence, reducing demand on foreign sources of oil and on the use of biofuels. Our members offer a full range of powered product including battery, electric, propane, CNG, diesel and gasoline electric hybrids, solar and biodiesel as well as gasoline with 0 to 10 percent ethanol.

Increasing the use of biofuels, and in particular, the use of mid-level ethanol blended fuels in the general purpose fuel market, presents enormous challenges to manufacturers and users alike.

No engine product in our legacy portfolio or coming off the production lines today is designed, built or warranted to run on any gasoline fuel containing more than 10 percent ethanol.

We are not anti-ethanol. We can design products to run on mid-level ethanol fuel given adequate lead time and assurance that the “design fuel” is available in the marketplace and is reflective of the certification fuel specified by EPA for emissions compliance. Ours is roughly a ten percent design window for any ethanol blend fuel...for example 0 to 10 percent, 10 to 20 percent or 20 to 30 percent.

EPA has approved a 15 percent ethanol blend fuel for use in model 2001 and newer automobiles. EPA has signaled that E-15 may be available at retail this summer and is certainly available at blender pumps. It has not approved its use for any non-road engine product. No outdoor power equipment, no boats, no snowmobiles, no ATVs, specialty

vehicles or watercrafts are permitted to run on E-15. EPA has said that they will use a label to affix to E-15 pumps to inform consumers about its use.

Should E-15 become available, and especially if cheaper than E-10, widespread misfueling will occur.

This is a problem not just to our customers and users but to the ethanol industry as well. A label is inadequate to prevent misfueling. What goes in the car goes in the can. What goes in the can goes in the generator, chainsaw, bass boat, snowmobile, lawnmower, jet ski, utility vehicle and the list goes on. When product fails someone is going to get a black eye and that includes the ethanol industry. Non-road product does not use a lot of fuel by volume but a lot of non-road product is in use. This is the dilemma we face together.

III. DOCUMENTED ADVERSE IMPACTS OF E-15 ON NON-ROAD PRODUCTS AND AIR QUALITY

In the Growth Energy E-15 waiver docket, OPEI and the Alliance for an Alternative Safe Fuels Environment (AllSAFE) submitted comprehensive comments to EPA documenting the failures and operating problems that could result from mid-level ethanol fuels. (These comments are attached to my testimony and are available at www.allsafefuels.com). As the AllSAFE comments document, the adverse impacts of E-15 on non-road engines and products include the following:

A. Heat

Increased Ethanol in gasoline could result in increased engine heat, including consumer accessible components, such as the plastic engine cover, guards, etc.

Higher engine heat may result in potential safety concerns, especially in smaller hand held lawn and garden products that are held in close proximity to the operator. A product operator could inadvertently come in contact with the hotter plastic engine housing or other surfaces because they are unaware of the added heat caused by the higher Ethanol gasoline.

Current two-cycle engine oils do not mix well with alcohol, which may also increase engine heat and lead to premature engine failures. Increased heat causes damage to gaskets and piston seals, which in turn, causes increased emissions of HC and NO_x, as documented by the tests performed by DOE, which are analyzed in the AllSAFE comments on the E-15 waiver.

B. Fuel Leaks and Evaporative Emission Increases

The effects of higher ethanol levels on engine components are not fully known, but may result in earlier degradation of existing and legacy engine seals, gaskets, fuel lines, etc.; the deterioration of these components could lead to fuel leaks and increase the risk of fire if an ignition source is present.

E-15 also causes increased permeation and evaporative emissions.

C. Unintended/Early Clutch Engagement

Higher levels of Ethanol will also mean higher oxygen levels in fuel and result in higher engine revolutions per minute (RPMs).

The higher engine RPMs may present unintended clutch engagement, which may result in potential safety concerns for bladed products, such as brush cutters, edgers, chain saws, hedge trimmers and pruners where

the customer is expecting the blade to start moving at higher RPMs from prior product experience.

For example, a chain saw chain may now turn at idle speed when it did not with the lower Ethanol content fuel, which may surprise the operator and cause an accident.

Ethanol damage to engines and products is permanent. The Department of Energy's testing on outdoor power equipment concluded that 28 engines in four families (out of our 900 regulated engine families) showed increased heat, performance irregularities, failure and unintentional clutch engagement.

IV. LEGAL BACKGROUND

Given the severity of the hazards and damages that would result from misfueling non-road products on E-15, EPA has a corresponding legal obligation to first document how its misfueling controls will achieve its statutory mandate and effectively prevent misfueling and any "emission failures" from non-road products.

EPA's "partial waiver" would allow fuel to come on the market with inadequate misfueling controls and without a dedicated legacy fuel for use in those products for which E-15 was not approved. These are the very sort of problems that Congress intended to prevent in the 2007 amendments to the Energy Independence and Security Act (EISA). Specifically, Congress added procedural safeguards to the fuels-waiver process to specifically address their concerns with mid-level ethanol damaging non-road products and air quality. Under these new requirements, EPA cannot approve a mid-level ethanol fuel unless it determines there will not be "any failures or emission-exceedances" from non-road products. The E-15 waiver applicant did not meet this legal obligation in its E-15 waiver application.

The “partial waiver” (with inadequate misfueling controls) will result in E-15 damaging non-road products and air quality. Blender pumps currently dispensing E-15 could be having this effect now.

OPEI, along with the major associations that represent the manufacturers of non-road and on-road products, reluctantly filed a petition in December with the US Court of Appeals for the District of Columbia Circuit. This petition challenges EPA’s “partial waiver” approval for E-15 fuel. We believe the DC Circuit will find that EPA has not fulfilled its statutory obligations to ensure the safe introduction of E-15. The “partial waiver” for E-15 sets a bad precedent of how to introduce a new fuel. That bad precedent is further exacerbated by EPA’s weak misfueling controls and the lack of legacy fuel.

V. PETITION TO ENSURE THE AVAILABILITY OF LEGACY FUEL

To meet its legal obligation, EPA must require fueling stations to also carry E-10 fuels if they sell E-15. If a gasoline retailer only offers E-15 for sale, then consumers will be essentially forced to misfuel E-15 into their non-road products. The E-15 fuel waiver will significantly reduce the availability of the E-10 fuel supply. The E-15 waiver does not require retailers to ensure E-10 fuel availability for non-road products or “legacy” vehicles. Therefore even a robust misfueling control program will fail if E-15 becomes the predominately available market fuel.

In the absence of EPA action, this situation will occur, as there are several factors working against maintaining an E-10 fuel supply. A few of the contributing factors are:

- The non-road sector represents a very small market segment of the fuel consumed at retail, removing financial incentive for the retailer to maintain two fuel supplies.

- E-10 may be more expensive for the fuel retailer to offer and the consumer to purchase in comparison to E-15 due to tax subsidies, low volume consumption and reduced availability.

OPEI, along with a dozen national associations represents the owners and operators and manufacturers of outdoor power equipment, motorcycles, recreational vehicles, boats, and automobiles, submitted on March 23, a petition for rulemaking requesting EPA to ensure the availability of E-10. As documented in that petition (attached to my testimony), there is a legal precedent EPA should follow to require retailers to continue to make E-10 available. OPEI urges Congress to adopt federal legislation that explicitly requires gasoline retailers that sell E-15 to also make E-10 fuels available.

VI. COMPREHENSIVELY ADDRESSING SERIOUS PROBLEMS BEFORE ALLOWING E-15 TO ENTER THE MARKET

OPEI is committed to working with EPA to help it meet its legal obligations and to fill all the critical remaining data gaps. To that end, OPEI has been urging EPA for over a year to hold a solutions-oriented workshop or roundtable with all the stakeholders charged with developing and implementing effective misfueling controls. Pump changes, consumer interfaces, RFID interfaces, color-coding and measures should all be carefully considered. For example, EPA could mandate changes in the electronic consumer interface at the pump. If the consumer selects fuel with E-15, the interface could tell them it contains E-15 that may cause damage to some vehicles or engines and then ask them to acknowledge this before the pump will turn on.

Before allowing E-15 into the market, Congress should exercise its oversight authority and ensure that EPA fills all the misfueling-related data gaps and documents how its final control program will be effective in preventing misfueling.

OPEI urges Congress to adopt federal legislation that ensures that the “general purpose” E-15 fuels can not be introduced into the market until manufacturers are insulated from unfair exposure to potential EPA or CPSC recall liability and warranty liability resulting from the illegal misfueling with E-15 blends.

Manufacturers should be provided with adequate lead time and with financial incentives or tax credits to develop new products designed to run on alternative and renewable fuels, including mid-level ethanol.

Again, thank you for the opportunity to appear and for your time.

**OPEI Testimony for Senate Environmental and Public
Works – “Oversight Hearing on Domestic Renewable Fuels”**

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A.	American Coalition for Ethanol (ACE) Press Release Regarding Blender Pumps
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OUTDOOR POWER EQUIPMENT
INSTITUTE

**OPEI Response to Questions from Senate Environment and Public
Works Committee Following up to Ethanol Fuels
Hearing on April 13, 2011**

Response to Senator Inhofe

1. As you know, increased use of ethanol in the fuel supply raises serious concerns with non-road applications, including significantly higher engine exhaust temperatures, fire hazard, unintentional clutch engagement of handheld devices, irreversible ethanol damage to engines, and longer storage of fuel within tanks. Can you elaborate on some of these reliability issues facing outdoor equipment users when they are forced to utilize E10 and higher level ethanol blends?

Below are the principle, documented problems on the impacts of mid-level ethanol on non-road products. Attached is a comprehensive scientific evaluation, which further documents why mid-level ethanol's properties and characteristics cause all the problems summarized below (see Exhibit A). This scientific technical evaluation was prepared by Dr. Sahu, who has a Doctorate from the California Institute of Technology (Cal. Tech) in mechanical engineering. Dr. Sahu teaches Air Pollution Control at UCLA and currently serves on the ASTM subcommittee dealing with fuel specifications for mid-level ethanol. Additionally, attached is Dr. Sahu's technical critique of the DOE small engine test program which further documents the increased potential risks that mid-level ethanol fuel could pose to consumers operating engines and equipment designed for \leq E-10 fuels (see Exhibit B).

Summary of Adverse Impacts and Reliability Issues from Mid-Level Ethanol Fuels

- Increased hazards to consumers, possible CPSC recalls, and product liability.
 - Heat
 - Increased ethanol in gasoline could result in increased engine heat, including consumer accessible components, such as the plastic engine cover, guards, etc.
 - Higher engine heat may result in potential safety concerns especially in smaller hand held lawn and garden products that are held in close proximity to the operator. A product operator could inadvertently come in contact with the hotter plastic engine housing or other surfaces because they are unaware of the added heat caused by the higher ethanol gasoline.

- Current two-cycle engine oils do not mix well with alcohol, which may also increase engine heat and lead to premature engine failures.
 - Fuel leaks
 - The effects of higher ethanol levels on engine components are not fully known, but may result in earlier degradation of existing and legacy engine seals, gaskets, fuel lines, etc.; the deterioration of these components could lead to fuel leaks and increase the risk of fire if an ignition source is present.
 - Also, we do not know how engine components will be impacted over extended periods of time by higher ethanol levels when gasoline is stored in these products between growing seasons.
 - Unintended/early clutch engagement
 - Higher levels of ethanol will also mean higher oxygen levels in fuel and result in higher engine revolutions per minutes (RPMs).
 - The higher engine RPMs may present unintended clutch engagement, which may result in potential safety concerns for bladed products, such as brush cutters, edgers, chain saws, hedge trimmers and pruners where the customer is expecting the blade to start moving at higher RPMs from prior product experience.
- 2. In July of 2010, The Toro Company recalled nearly 40,000 snow blowers due to ethanol. In its release, it stated “exposure to ethanol in gasoline can cause the carburetor needle to become corroded. A corroded needle can stick in the open position and allow fuel to leak from the carburetor, posing a fire hazard to consumers.” In your testimony, you mentioned that your members have some “200 million legacy products in use today in every corner of the United States.” Can you discuss the safety liability issues facing your members?**

OPEI supports proposed legislation to mitigate the unfair imposition of liability on manufacturers who otherwise could be named as defendants due to fuel changes in the marketplace beyond their control.

3. What should be done to ensure the availability of low-ethanol blends or CLEAR gasoline for such legacy products?

Congress should consider legislation mandating the continued availability of <E-10 fuels for at least non-road products. Congress can also direct EPA to approve the enclosed petition for rulemaking that OPEI and other manufacturers and consumer-operators submitted on March 23, 2010. This petition requested EPA expeditiously issue a regulation to ensure the availability of <E-10 fuels for non-road products and older model year vehicles. (See Exhibit C).

Response to Senator Carper

- 1. Many of you speak about advanced biofuels demonstration projects that are underway. Can you please shed some light on when customers might see these fuels available at the pump? What is a realistic timeframe for their coming to market on a commercial scale?**

OPEI does not have information on fuel production or availability. An individual OPEI member company has provided the response below and is included here on their behalf. OPEI has not taken an official association position on the statement.

Briggs and Stratton, a large engine manufacturer located in Milwaukee, Wisconsin, is currently testing a bio-butanol fuel and submits the following as an individual response to the above question.

Briggs & Stratton, Corporation
Milwaukee, WI 53201-0702

May 10, 2011

Dear Senator Carper:

This is in response to your questions regarding biofuels demonstration projects.

Briggs & Stratton recently began an in depth performance testing program of bio-butanol and the effects it has on small off-road engines. As you know, unlike ethanol, bio-butanol has an energy content more similar to that of gasoline. Accordingly, it is our members' belief that the tests will demonstrate that the blending of bio-butanol with gasoline avoids many of the technical issues associated with blending of gasoline with ethanol. The testing is currently ongoing, and is scheduled to be completed in August of this year.

Among the expected benefits of bio-butanol are:

1. It has a higher energy content than ethanol.
2. It is not as corrosive as ethanol.
3. Butanol/gasoline blends are less susceptible to water absorption and separation, allowing butanol to be transported via the existing infrastructure/pipelines instead of by truck or train.
4. It provides better fuel efficiency than ethanol.
5. Butanol has inherently less enleanment characteristics when blended with gasoline than ethanol. This results in less change in air/fuel ratio resulting in better engine performance and longer engine life in engines using fixed fuel systems, which is very typical in our industry.

6. Moreover, because butanol/gasoline blends are less susceptible to water absorption and separation, there will be less gel formation and consequently less carburetor jet clogging.

As to your question regarding the commercial availability of the fuel, bio-butanol could be produced in a plant that currently produces ethanol. The conversion cost for an ethanol plant is approximately 30 percent of the original cost of the plant. While this certainly would not be an inexpensive proposition, if one considers that it would not be necessary to replicate the current infrastructure the petroleum industry utilizes in order to make ethanol available on a national basis, the cost to convert ethanol plants to bio-butanol plants is relatively modest.

Currently, the ethanol industry produces approximately 14 billion gallons of ethanol per year. It is conceivable that without further governmental encouragement, advanced biofuels – including bio-butanol – could produce 1 to 2 billion gallons of fuel by 2015; of course, the conversion of existing ethanol plants would allow for substantially greater production quantities of bio-butanol.

Based on the foregoing, we believe there are some alternatives the Committee should consider:

- 1) Suspend implementation of higher ethanol blending above E-10.
- 2) Eliminate government incentives and other advantages available for ethanol (including the funding of blender pumps).
- 3) Create a level playing field for all biofuels from the perspective of tax and regulation so all biofuels can compete on performance and price.
- 4) Require the EPA to conduct tests using other biofuels, including bio-butanol, to understand the risks faced by the small engine category in mandating the use of higher ethanol content in gasoline.

We hope this is responsive to your inquiry.

Senator BOXER. Thank you very much. Other than that, you love it, right?

[Laughter.]

Senator BOXER. Mr. Scott Faber, and let me say, vice president, Federal Affairs, Grocery Manufacturers Association. Welcome.

STATEMENT OF SCOTT FABER, VICE PRESIDENT OF FEDERAL AFFAIRS, GROCERY MANUFACTURERS ASSOCIATION

Mr. FABER. Thank you, Madam Chair.

My name again is Scott Faber. The Grocery Manufacturers Association represents more than 300 food, beverage and consumer product companies. We directly employ 1.7 million Americans in more than 30,000 communities, many rural communities.

When I appeared before this committee in July 2008, tightening supplies of basic commodities and rising and volatile food prices was contributing to unrest in more than 30 countries and food inflation at home.

Unfortunately, tightening supplies of basic commodities are once again contributing to high food prices. Overall, food at home prices are expected to increase by 3.5 to 4.5 percent in 2011 with even higher prices expected for basic staples like milk, meat and eggs.

The same factors that caused a perfect storm in 2008 are once again contributing to rising food and food ingredient prices including strong global demand, poor weather, rising energy costs, commodities speculation and trade restrictions. But one very significant difference between 2008 and 2011 is that even more of our food, and primarily feed, is being diverted to produce fuel.

In 2008, one-quarter of our corn crop was diverted from food and feed to fuel. Today, nearly 40 percent of U.S. corn production is diverted from feed and fuel to produce more than 13 billion gallons of corn ethanol. During the same period, corn yields increased by less than 6 percent and as a result, corn stocks are at or near record lows, contributing to high prices and extreme volatility.

Unfortunately, rather than allowing the market to ration these tightening supplies, our mandates and subsidies continue to automatically divert more and more food and feed to our fuel supplies and trade barriers continue to limit the importation of less costly fuel alternatives.

As we heard from Secretary Vilsack this morning, the price of food, especially the price of meat, poultry, dairy and eggs, is closely linked to the price of feed and food ingredients. On average, in particular feed costs, represent about 70 percent of the cost of producing meat and poultry and a smaller but significant share of processed foods.

While food manufacturers are reluctant to pass these costs of production on to consumers, higher commodity prices often result in higher retail food prices, especially for basic staples. Many experts have confirmed the link between our food-to-fuel policies and higher food prices.

The CBO, in fact, reported in 2009 that corn ethanol production contributed 10 to 15 percent of the increase in food prices that we saw between April 2007 and 2008.

So, let me just take a minute to provide some recommendations.

We believe now is the time to revisit and reform these policies to accelerate the development of advanced biofuels and to freeze the amount of food and feed that is being diverted to our fuel supplies. In particular, we urge Congress to freeze the amount of corn ethanol that must be blended into gasoline in order to provide advanced biofuels more time to reach commercial scale, to permit changes to engines unable to safely operate with higher ethanol blends, to complete assessments of the impacts of higher blends on engines and on the environment, and to allow corn yields to catch up with the artificial demand that has been created by the RFS.

Congress should also immediately end the Volumetric Ethanol Excise Tax Credit, or VEETC, and instead invest in advanced biofuels. Immediately ending the VEETC would save taxpayers \$4.8 billion and would have virtually no impact on corn ethanol production. Economists at CBO, GAO and leading universities have concluded that the VEETC is a costly redundancy to the corn ethanol mandate.

Congress should also reject proposals to redirect the VEETC to corn ethanol infrastructure until advanced fuels reach commercial scale, investments and policies designed to bring higher ethanol blends to the marketplace will divert even more of the U.S. corn crop to our fuel supply.

So, let me conclude by saying that we strongly support policies that will help bring advanced biofuels to the marketplace.

Thank you.

[The prepared statement of Mr. Faber follows:]

Testimony of Scott Faber
Vice President of Federal Affairs
Grocery Manufacturers Association
before the
Senate Committee on Environment and Public Works
“Oversight Hearing on Domestic Renewable Fuels:
From Ethanol to Advanced Biofuels”
April 13, 2011

Good morning. My name is Scott Faber. I am Vice President for Federal Affairs for the Grocery Manufacturers Association.

Thank you for the opportunity to testify this morning.

The Grocery Manufacturers Association represents more than 300 food, beverage and consumer product companies who directly employ 1.7 million Americans in more than 30,000 communities.

When I appeared before this Committee in July 2008, tightening supplies of basic commodities and rising and volatile food prices were contributing to unrest in 31 countries and food inflation at home.

Unfortunately, tightening supplies of basic commodities are once again contributing to food inflation.

Overall, food at home prices are expected to increase by 3.5 to 4.5 percent in 2011, with even higher prices expected for basic staples like milk, meat and eggs.¹ The same factors that caused a “perfect storm” in 2008 are once again contributing to rising food and food ingredient prices, including strong global demand, poor weather, rising energy costs, commodity speculation and trade restrictions.²

One difference between 2008 and 2011 is that *even more* of our food and feed is being diverted to produce fuel.

In 2008, one-quarter of our corn crop was diverted from food and feed to fuel.³ Today, nearly 40 percent of U.S. corn production is diverted from food and feed to produce more than 13 billion gallons of corn ethanol.⁴ During the same period, corn yields increased by less than six percent.⁵

¹ U.S. Department of Agriculture, *Food CPI and Expenditures: CPI for Food Forecasts* (2011), <http://www.ers.usda.gov/Briefing/CPIFoodAndExpenditures/Data/cpiforecasts.htm>.

² Robert Trostle, USDA Economic Research Service, *Global Agricultural Supply and Demand: Factors Contributing to the Recent Increase in Food Commodity Prices* (May 2008).

³ Derived from Food and Agricultural Policy Research Institute- Iowa State University data, <http://www.fapri.iastate.edu/tools/outlook.aspx> (last visited Apr. 10, 2011).

⁴ USDA, *World Agricultural Supply and Demand Estimates*, WASDE-493 at 13 (2011).

⁵ *Id.*

As a result, corn stocks are at or near record lows, contributing to high prices and extreme volatility.^{6,7}

Rather than allowing the market to ration tightening supplies, ethanol mandates and subsidies continue to automatically divert more and more food and feed to our fuel supplies, and trade barriers continue to limit the importation of less costly fuel alternatives.

As you know, the price of food – especially meat, poultry, dairy and eggs – is closely linked to the price of feed and food ingredients. On average, feed costs represent 70 percent of the cost of producing meat and poultry and a smaller, but significant, share of processed foods.^{8,9} While food manufacturers are reluctant to pass these costs of production onto consumers, higher commodity prices often result in higher retail food prices, especially for basic staples.

Many experts have confirmed the link between our food-to-fuel policies and higher food prices, including researchers at the International Food Policy Research Institute.¹⁰

As the Congressional Budget Office (CBO) reported in 2009, corn ethanol production contributed 10 to 15 percent of the increase in retail food prices between April 2007 and April 2008.¹¹ In the same report, CBO estimated that corn ethanol production added \$600 million to \$900 million to the cost of federal feeding assistance programs in FY 2009.¹²

While our food-to-fuel policies have certainly contributed to higher food prices, our food-to-fuel mandates, subsidies and trade protections have so far failed to bring to commercial scale advanced fuels that could help reduce food price inflation and volatility. As you know, slightly more than 2 million gallons of cellulosic or advanced biofuels will be produced in 2011 – or one thousandth of one percent of the fuel used in commerce.^{13,14}

Recommendations

Now is the time to revisit and reform our food-to-fuel policies. In particular, we urge Congress to:

Freeze the Corn Ethanol Mandate

Congress should freeze the amount of corn ethanol that must be blended into gasoline to provide advanced fuels more time to reach commercial scale, to permit changes to engines unable to safely operate with higher ethanol blends, to complete assessments of the impacts of higher blends on engines and the environment, and to allow corn yields to “catch up” with the artificial demand created by the

⁶ *Id.*

⁷ Corn prices are currently nearing \$8/bushel, a record high.

⁸ Geoffrey Becker, Congressional Research Service, *Livestock Feed Costs: Concerns and Options* (2008).

⁹ Patrick Canning, USDA Econ. Res. Svc., *A Revised and Expanded Food Dollar Series: A Better Understanding of Our Food Costs*, Report No. ERR-114 (Feb. 2011).

¹⁰ Shenggen Fan et al., *Urgent Actions Needed to Prevent Recurring Food Crises*, IFPRI Policy Brief 16, Food & Agric. Pol. Res. Inst. (Mar. 2011).

¹¹ Congressional Budget Office, *The Impact of Ethanol Use on Food Prices and Greenhouse-Gas Emissions* at 6 (2009).

¹² *Id.* at 11.

¹³ Food & Agric. Pol. Res. Inst., University of Missouri, *US Baseline Briefing Book: Projections for Agricultural and Biofuel Markets*, FAPRI-MU Report #02-11 (Mar. 2011).

¹⁴ Derived from Energy Information Administration Short Term Energy Outlook, available at <http://www.eia.doe.gov/steo/> (last visited Apr. 10, 2011).

Renewable Fuel Standard. Some experts predict a 13 percent increase in yields between 2011-2020.¹⁵ In addition, Congress should also reform the Energy Independence and Security Act of 2007 to require a mandatory reduction in the corn ethanol mandate linked to corn availability.

Invest in Advanced Biofuels, Not Corn Ethanol

In addition, Congress should immediately end the Volumetric Ethanol Excise Tax Credit (VEETC) and instead invest in advanced fuels.

Immediately ending the VEETC would save taxpayers \$4.8 billion and would have minimal impact on corn ethanol production.¹⁶ Economists at the Congressional Budget Office, Government Accountability Office, and at leading universities have concluded the VEETC is a costly redundancy to the corn ethanol mandate.^{17,18} A July 2010 report from Iowa State University found a one-year extension of the ethanol subsidy and tariff would add just 427 additional direct domestic jobs at a cost of almost \$6 billion, or \$14 million per job.¹⁹ A separate study by Advanced Economic Solutions found that the VEETC will only induce 400 million gallons of new production and 296 new jobs in 2011 -- at a cost of nearly \$20 million per job.²⁰

Congress should reject proposals to redirect the VEETC to corn ethanol infrastructure. Until advanced fuels reach commercial scale, investments and policies designed to bring higher ethanol blends to the market place will divert 50 percent or more of the US corn crop and will cost more than \$9 billion.^{21,22} More than 90 organizations -- including organizations representing animal agriculture, environmental advocates, religious leaders, anti-hunger advocates, and fiscal conservatives -- have joined together to oppose new federal investments in corn ethanol infrastructure.²³

Instead, Congress should invest in advanced fuels that convert crop waste, food waste, solid waste and other fuel feed stocks that do not pit our energy security needs against our food security needs.

¹⁵ Food & Agric. Pol. Res. Inst., *supra* note 14.

¹⁶ Bruce A. Babcock et al., *Costs and Benefits to Taxpayer, Consumers, and Producers from U.S. Ethanol Policies*, Staff Report 10-SR 106, Iowa State University Center for Agricultural and Rural Development (2010).

¹⁷ Congressional Budget Office, *Using Biofuel Tax Credits to Achieve Energy and Environmental Policy Goals* (2010).

¹⁸ Government Accountability Office, *Opportunities to Reduce Potential Duplication in Government Programs, Save Tax Dollars, and Enhance Revenue*, GAO-11-318SP (2011).

¹⁹ Babcock, *supra* note 17.

²⁰ Advanced Economic Solutions, *An Economic Analysis of the Impact of the Removal of the Ethanol Blender Tax Credit* (Nov. 2010).

²¹ Adv. Econ. Solns., *Implications for US Corn Availability Under a Higher Blending Rate for Ethanol: How Much Corn Will Be Needed* (June 2009).

²² Sheila Karpf, *Locking in Corn Ethanol Locks Out Alternatives*, Environmental Working Group (Apr. 2011).

²³ Letter from ActionAid US et al. to Majority Leader Reid and Minority Leader McConnell (Mar. 1, 2011).



May 18, 2011

The Honorable Barbara Boxer
Chairman
U.S. Senate Committee on
Environment and Public Works
410 Dirksen Senate Office Building
Washington, D.C. 20510

The Honorable James Inhofe
Ranking Member
U.S. Senate Committee on
Environment and Public Works
410 Dirksen Senate Office Building
Washington, D.C. 20510

Dear Chairman Boxer and Ranking Member Inhofe:

Thank you for the opportunity to provide testimony before the Senate Committee on Environment and Public Works at the "Oversight Hearing on Domestic Renewable Fuel: From Ethanol to Advanced Biofuels."

Response to questions from Senator Carper:

Question 1: Many of you speak about advanced biofuels demonstration projects that are underway. Can you please shed some light on when customers might see these fuels available at the pump? What is a realistic timeframe for their coming to market on a commercial scale?

GMA response: GMA strongly supports the development and use of advanced biofuels that do not pit our energy and environmental security needs against our food security needs. As you know, the Food and Agricultural Policy Research Institute (FAPRI) and Energy Information Administration have reported that many advanced biofuels are currently under development and will reach commercial scale within the next few years. FAPRI, for example, estimates that 810 million gallons of cellulosic biofuels will be produced over the next five years.

Question 2: Mr. Faber, can you please comment of Secretary Vilsack's claims in his testimony today that oil prices, not biofuels, are driving food costs?

GMA response: As Secretary Vilsack noted in his testimony, food-to-fuel production is one factor in rising feed and food prices. We share the view of the Secretary and the view of experts at the Congressional Budget Office, the International Food Policy Research Institute, and the World Bank, that

GROCERY MANUFACTURERS ASSOCIATION

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corn ethanol is one of many factors contributing to food inflation. Other factors include energy prices, poor weather, and increasing global demand for food and commodities.

Question 3: Does the Grocery Manufacturers Association support advanced biofuels and do you think Federal policy should support the growth of advanced biofuels?

GMA response: GMA strongly supports the development of advanced biofuels that do not pit our energy and environmental security needs against our food security needs. Rather than investing in conventional fuels and infrastructure that divert food and feed to our fuel supplies, GMA urges Congress to allow corn ethanol subsidies and tariffs to expire and to instead invest in the development of advanced biofuels.

Response to questions from Ranking Member Inhofe:

Question 1: Mr. Faber, corn prices recently hit new highs in response to USDA's recent report that ending stocks for the 2010-2011 season would be just 675 million bushels. It's my understanding that this is the lowest number in the past 15 years. That tells me that corn markets are very tight. What if Mother Nature doesn't cooperate and the ending stocks are even lower? What would this mean for food prices in the event of a real supply squeeze?

GMA response: As you know, historically low ending stocks are contributing to unprecedented corn price volatility and are increasing the risk of significantly higher commodity prices during periods of poor weather, such as recent flooding along the Mississippi River and its tributaries. GMA strongly supports efforts to amend the RFS to automatically reduce the corn ethanol mandate when corn supplies fall too low.

A February 2011 study by a Purdue University economist and a USDA economist concluded:

*"With an even larger share of corn production going to ethanol, and with that source of demand being determined by mandates instead of market prices, there is potential for significant increases in agriculture commodity market volatility. Indeed, we estimate that, in the presence of a binding RFS, the inherent volatility in the US coarse grains market will rise by about one-quarter. And the volatility of the US coarse grains price to supply side shocks in that market will rise by nearly one-half."*¹

Question 2: Many families are struggling given the current state of the economy. Could you provide me with an estimate about how much our corn ethanol policy costs each family per year in food inflation?

¹ Hertel and Beckman, *Commodity Price Volatility in the Biofuel Era: An Examination of the Linkage between Energy and Agricultural Markets*, 2011. *See also* Irwin and Good, *Alternative Corn Production Scenarios and Policy Implications*, 2010 (noting that corn ethanol mandates could contribute to record prices in the event of extreme weather).

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GMA response: USDA estimates that food prices will rise by 3 to 4 percent in 2011, including more significant increases in the cost of basic staples such as milk, meat, poultry, and eggs. As you know, CBO estimates that corn ethanol accounts for 10 to 15 percent of recent increases in food prices, and other experts have found that corn ethanol contributes an even larger share of food price inflation.² During the past decade -- when corn ethanol production has increased from 1.6 billion gallons to 13.3 billion gallons -- USDA estimates that the monthly cost of food at home for a family of four has risen from \$699 in 2000 to \$741 in 2002 to \$825 in 2006 to \$949.20 in 2010. In addition to increasing the cost of food at home, corn ethanol production has also significantly increased the cost of federal feeding assistance programs, according to CBO.

Thank you for the opportunity to testify before the Senate Committee on Environment and Public Works.

Sincerely,



Scott Faber
Vice President, Federal Affairs

² Collins, The Role of Biofuels and Other Factors in Increasing Farm and Food Prices, 2008

Senator BOXER. Thank you so much.

Well, this has been really interesting so far.

Last, but not least, Mr. Brooke Coleman, Executive Director, Advanced Ethanol Council.

Before we begin, because of an 11:30 issue I have, I am going to turn the gavel over to Senator Whitehouse.

Senator WHITEHOUSE. Oh, come on.

Senator BOXER. I know.

[Laughter.]

Senator BOXER. We almost had a deal here, but Senator Inhofe said he could not promise me that he would not overturn any laws dealing with climate change. So, I had to call on my pal over here.

[Laughter.]

Senator BOXER. Just kidding.

So, Mr. Brooke Coleman, if you could conclude.

**STATEMENT OF BROOKE COLEMAN, EXECUTIVE DIRECTOR,
ADVANCED ETHANOL COUNCIL**

Mr. COLEMAN. Chairman Boxer, thank you. Ranking Member Inhofe, members of the committee, I appreciate the opportunity to speak here today.

My name is Brooke Coleman. I am the executive director of the Advanced Ethanol Council. The Advanced Ethanol Council represents worldwide leaders in the effort to develop and commercialize the next generation of ethanol fuels ranging from cellulosic ethanol fuels from switchgrass, agriculture waste, and wood chips to advanced ethanol fuels from energy crops, municipal solid waste and algae.

I want to start quickly with the big picture. When people talk about biofuels, and particularly ethanol, there is this spatial amnesia that seems to kick in and we focus solely on what is wrong with what we have today and not so much on where we have come from and where we are headed. I want to pull the lens back a little bit.

We talked a little bit this morning with Secretary Vilsack about the benefits of the ethanol industry in rural America and he talked about the job creation, etcetera. What we did not talk about was the baseline. The baseline was, people seem to think that \$1.80 per bushel of corn was good for farmers, good for the American taxpayer, that there was this nice balance between supply and demand.

The reality was that grains were overproduced, farmers were going belly up, and the taxpayer was footing that bill and paying for that bill. So, when we think about, well, I am just opposed to this corn ethanol stuff, I think we have to keep that in perspective.

The other thing is that they built 200 biorefineries at a time when we were exporting jobs and capital at an alarming rate to China and India. Two hundred biorefineries.

The third thing, and this is what is most important to our industry, is they are proving out the effectiveness of the ethanol chemical in the marketplace. That is tremendous if you are trying to produce it from a different set of feedstock because investors, that reduces risk and investors know that that chemical works.

The second big lens issue is foreign oil dependence and, whether you like corn ethanol or not, they are displacing a lot of foreign oil.

Last year, the U.S. ethanol industry alone displaced more oil than we import from Saudi Arabia every single year. So, I think the second charge for the renewable fuels industry with the Energy Independence and Act was to reduce foreign oil.

But that brings, and there is a critical reason, of course. People talk about the dangers of foreign oil all the time and I would like to just focus on one issue. In 2008, Scott mentioned that prices went up. During that period, American taxpayers transferred almost \$1 trillion to OPEC in wealth. So, when we hear in the advanced biofuels industry, and that was over 6 months, so when we hear we cannot get \$1.5 billion, \$2 billion in loan guaranty money, what we cannot afford is the status quo.

Moving on to the third and most important issue, and that is the advanced biofuels industry. I stand united with my colleagues when I say that we have been asked to innovate, we have been asked to put a lot of the gallons in the marketplace, and we have stepped up. We have about 50 projects nationally in various stages of development. We have attracted in the vicinity of \$1.5 billion in private sector investment.

I want to make clear as well that we have a proven technology. So, step one is proving that you can produce the fuel. Step two is showing that you can produce the fuel at the ranges of fuel today, so \$2.60, \$2.70 a gallon. Our companies have shown that. I am sure a lot of Mike's companies have shown that. The next step of course is commercialization.

So why do we need this policy? Here is the most important part. The marketplace is not competitive. It is monolithic. Our cars are not FFVs like they are in Brazil. There is no choice at the pump. The incumbent oil companies, who had subsidies for 100 years, continue to get subsidies. The blend wall, which people talk about as a corn ethanol problem, is really a problem for us because our investors are looking out 5 years and seeing questionable demand. That creates a reverse domino effect where they are looking and they are saying, the risk is too high, we are not going to invest. And, of course, that exacerbates plant finance problems.

So what are we going to do about it? The most important thing, bar none, is no backsliding. We have to keep the RFS. Even the perception that it might be overturned is bad for advanced ethanol.

The second is we have to open up the marketplace. We need the opportunity to compete. Everybody wants to see a free marketplace, but it is not as easy as showing up with a cost-competitive, cheaper fuel in this marketplace when it is this vertically integrated.

Third, and this is very, very important as well, we need a tax policy that reflects 2011 and the commitment that Congress has made in the RFS instead of tax policy that is oriented 100 years ago when it was very important at that time to produce more oil and to mitigate the risk of drilling in case there was nothing found. So we really have to have the tax policy catch up with the RFS to get this done.

So we stand ready to produce these gallons and what we need more than anything else is certainty over time.

Thank you very much.

[The prepared statement of Mr. Coleman follows:]

**Environment and Public Works Committee
United States Senate**

Oversight Hearing on Domestic Renewable Fuels: From Ethanol to Advanced Biofuels

Testimony of:

**Brooke Coleman
Executive Director, Advanced Ethanol Council**

April 13, 2011

Good morning, Chairman Boxer, Ranking Member Inhofe, and Members of the Committee. My name is Brooke Coleman and I am the Executive Director of the Advanced Ethanol Council (AEC).

The Advanced Ethanol Council represents worldwide leaders in the effort to develop and commercialize the next generation of ethanol fuels, ranging from cellulosic ethanol made from switchgrass, wood chips and agricultural waste to advanced ethanol made from sustainable energy crops, municipal solid waste and algae. Our members include those endeavoring to produce advanced ethanol themselves, those interested in augmenting conventional ethanol plants with "bolt on" advanced ethanol production capacity, and those developing and deploying the technologies necessary to develop and commercialize advanced ethanol. The founding members of the AEC include Abengoa Bioenergy, BlueFire Renewables, Coskata, Enerkem, Fulcrum BioEnergy, Inbicon, Iogen, Mascoma, Osage Bio Energy and Qteros. We are affiliated with the Renewable Fuel Association (RFA) because we share a common goal of promoting the use of ethanol and broadening the types of feedstocks and processes used to produce the fuel.

This is certainly an important and timely hearing, and we appreciate the opportunity to be here today to discuss renewable fuels and the emerging advanced ethanol industry. My role today is to talk about advanced biofuels, and specifically advanced ethanol, in the context of existing and prospective U.S. renewable fuels policy. But I would like to start with something that is too often lost in the debate about Alternative Fuel A versus Alternative Fuel B, and that is: context.

Background: The Importance of Domestic Renewable Fuels Production

Much of the public and political discourse around renewable fuels has turned negative. Often lost in the perpetual critique of biofuels are the tremendous economic and environmental benefits of domestic renewable fuel production. Arguments to the contrary notwithstanding, the renewable fuels industry has generally met every challenge put before it over the last decade or more.

There are two primary examples:

- 1) The early stages of renewable fuel development in this country came as a result of a national interest in promoting rural economic development. We seem to forget how recently U.S. farmers were "price takers" selling over-supplied grains at below cost and struggling to make a living. Our government was forced to price support U.S. farmers to the tune of at least

several billion dollars per year, to make sure that rural America did not collapse under the weight of its own success in producing more grain from each acre of land over time. There is a false underlying presumption that, before biofuels, we had a good balance between supply and demand in the agricultural sector, and that \$1.70 per bushel of corn was good for America, good for government spending, and good for world hunger. This is a fantasy. American farmers' increasing productivity flooded international markets with below cost grain and drove the U.S. government to provide crop assistance and invest in research for alternative uses of American crops. The proliferation of corn syrup is one example. Biofuels is another. At a time when we are exporting manufacturing jobs to countries like China and India at an alarming rate, deepening our deficit and revenue problems, the biofuels industry has built more than 200 biorefineries since 1988, employing hundreds of thousands of Americans, increasing the national GDP by more than \$50 billion and raising household income by more than \$35 billion. As a point of contrast, the oil industry has not built a refinery in the United States since 1976. In short, the renewable fuel industry met the initial charge of becoming an economic engine in rural America, and as discussed below, the advanced ethanol industry (if given a chance) will take the next step, spreading the wealth to states and regions not normally associated with renewable fuels.

- 2) The second challenge put before the domestic renewable fuels industry, with the enactment of the Energy Independence and Security Act (EISA) in 2007, was to reduce our dependence on foreign oil. Reducing our dependence on foreign oil should be an issue that unifies Congress. Central bank chairman Ben Bernanke recently stated that, "sustained rises in the prices of oil or other commodities would represent a threat both to economic growth and to overall price stability, particularly if they were to cause inflation expectations to become less well anchored." Credit T. Boone Pickens for taking this issue to a new level of candor when he said, "our dependence on foreign oil is killing our economy." Credit Donald Trump for highlighting the two unparalleled job killers this country faces when he said that China and OPEC are "eating our lunch." Americans transferred nearly \$1 trillion to OPEC member states during the last oil price spike in 2008, which only lasted about 6-8 months. EIA forecasts suggest that recent trends above \$100 per barrel are not a spike, but are instead a new equilibrium.

These massive transfers of wealth have lasting effects. According to the U.S. Department of Energy, every major oil spike in history has been followed by a recession. Foreign oil is the single largest part of the federal trade deficit, and we all know that the jobs follow the money. Americans are paying a price they cannot afford for foreign oil, and there is no relief in sight. High oil prices in the past have encouraged more exploration, more extraction, more production and gradually increasing stocks. As noted in the March 2011 edition of *Science* magazine, "not this time." Meanwhile, worldwide demand, even in recession, is skyrocketing; from 2003 through 2010, China's vehicle population grew at an annual rate of 18.6%, hitting the roads and consuming petroleum far faster than even the most ambitious projections.

So what role has the renewable fuels industry played in this problem? Last year, the U.S. ethanol industry alone displaced more oil than we import every year from Saudi Arabia. To date, the conventional ethanol industry has met the volumetric challenge put before it by the federal RFS, while simultaneously reducing the energy and natural resources required to produce ethanol. And this is just the first step.

We understand from testimony here today, and from talking to members of Congress, that some consumers do not want biofuels in their gasoline. This may be the case. But before we consider rolling back the clock, and potentially undercutting the domestic renewable fuel industry, we should be careful to consider the ramifications: (1) renewable fuels have become an important and stable source of income and job creation in rural America; and, (2) every gallon of biofuel not used is another gallon of oil (and most likely, foreign oil) that will need to be purchased at debilitating prices by American consumers.

So what about the pump price impacts of using less ethanol? Ethanol is now a major player in U.S. gasoline markets, accounting for roughly 10 percent of nearly every gallon of gasoline sold in America. In a world economy in which the possibility of a supply disruption sends prices skyrocketing, actually reducing fuel supply would have severe implications for gas prices. According to Merrill Lynch, gas prices would be 15 percent higher without ethanol. At \$4 per gallon, which is the price right now in California, that's roughly 60 cents per gallon. Most economists agree that the impact would be significant, ranging from 20 cents to more than 60 cents per gallons. The rack price of ethanol is currently about \$2.60 per gallon. The wholesale price of gasoline is ~ \$3.20. Taking a broader perspective, Americans simply cannot afford to export more jobs and revenue overseas to secure transportation fuel. We need to start reversing this trend instead of adopting policies that perpetuate it.

Then there is the issue of where the oil industry is headed. When thinking about consumer cost, it is misleading to compare tomorrow's advanced biofuels to today's oil when the cost curves are headed in opposite directions. Using more biofuels displaces what is called the "marginal barrel" of oil – the "new" barrel coming into the marketplace along the margins of world oil production. This new barrel is no longer light sweet crude because the light sweet crude resource cannot keep up with demand. The marginal barrel is most often oil extracted using thermal enhancement, heavy or extra heavy oil, or tar sands (bitumen). The marginal barrel of oil is usually the most expensive, energy-intensive, ecologically destructive, and highest carbon-intensity liquid fuel in the marketplace. We already spend roughly \$400 billion per year on foreign oil. This figure will spike rapidly as unconventional oil becomes more prevalent. Investing a tiny fraction of this cost in advanced biofuels, as an alternative to the marginal barrel of oil, will pay large and permanent (when the domestic advanced biofuels industry emerges) dividends for American consumers.

The Third Challenge: Bringing Advanced Biofuels to Market

If the first two challenges put before the U.S. renewable fuels industry were rural economic development and reducing foreign oil dependence, the third challenge (also embodied by EISA and the federal RFS) is bringing advanced biofuels to market. Before getting into what we do (and do not) need to make this vision a reality, it is important for policymakers to understand exactly where these companies stand with regard to commercialization.

The federal RFS contains very aggressive blending requirements for advanced biofuels. This is appropriate, given the nature of the oil dependence problem we face. But it also creates the potential for non-compliance. Fortunately, the architects of the RFS were well-aware of the uncertainties in the marketplace, and the program provides EPA with flexibility. Recent downward adjustments to the cellulosic biofuels blending requirements have set in motion a dialogue about the readiness of the advanced biofuels industry to produce commercial-scale volumes of fuel.

This is where we stand:

- 1) There are more than 50 cellulosic and advanced biofuel demonstration and pilot projects built, under construction or in scale-up in the United States. According to both U.S. EPA analysis and California Air Resources Board carbon accounting methodologies, these facilities are producing the lowest carbon fuel in the country, in comparison to both existing fuels and even future fuels such as electricity and hydrogen. There are many more potential projects under consideration, hinging largely on whether Congress makes clear that it is standing behind its initial commitment to advanced biofuels.
- 2) The technology for cellulosic and advanced biofuels is ready. Companies have demonstrated success and significantly reduced cost at each stage of the research, development and scale-up process. The industry is moving toward deployment of commercial-scale volumes to meet the RFS. See Addendum A to my testimony for further information about production cost.
- 3) Commercial development of advanced biofuels has been slowed by the recession. This is true for nearly every business sector in the United States. But there are also acute financing gaps – often associated with the so-called Valley of Death – that are exacerbated by an unsettled, policy-driven and largely non-competitive U.S. fuel marketplace. The “financing gap” and “restricted marketplace” problems must be addressed in order for our industry to reach its full potential.

The Need for Further Government Engagement: Why It’s Appropriate and Necessary

The advanced biofuels industry stands ready to meet the challenge of bringing commercial-scale advanced biofuel gallons to market, as called for by the federal RFS. The success of the industry will create jobs, reduce our deficit, increase revenue, and greatly improve the environmental footprint of the U.S. transportation fuel industry. But it will require continued government involvement during the initial stages of scale-up.

Here is why the U.S. government must deepen its support of advanced biofuels:

1) The status quo is bankrupting the country.

With fiscal responsibility on the minds of nearly every member of Congress, there is no bigger drain on our economy and revenues than foreign oil dependence. It is the single largest piece of the \$497.8 billion 2010 federal trade deficit, and represents a huge fraction of annual spending by U.S. consumers that is not recirculating through our economy. According to the Institute for Local Self Reliance, 75 cents of every dollar spent on biofuels re-circulates through the local economy; conversely, 75 cents of every dollar spent on oil exits the local economy, and in most cases, the country. Only Alaska exports significantly more oil than it consumes; other U.S. states export jobs and capital to other regions and countries to secure fuel energy. American consumers and our economy simply cannot afford to take a “hands off” approach to this problem.

2) We are not going to “free market” our way out of the foreign oil dependence problem, because the U.S. transportation fuel market is not a free market.

The U.S. transportation fuel marketplace is highly regulated, driven by policy as opposed to price, and is dominated by highly-consolidated incumbent oil companies that continue to receive the large majority of federal subsidies to the U.S. fuel energy sector.

For example, a recent study showed that fossil fuels received 70 percent of U.S. federal energy subsidies between 2002 and 2008, not including the loopholes in oil and gas laws that, according to the Government Accountability Office (GAO), allowed petroleum companies to forego paying \$53 billion in royalty payments, over just four years, for extracting natural resources from lands owned by the American taxpayer (source: ELI). Capital investments, such as oil field leases and drilling equipment, are taxed at an effective rate of 9 percent, which is far lower than the standard rate of 25 percent and lower than virtually any other industry.

The now infamous Deepwater Horizon offers case-in-point. The Deepwater Horizon was owned by Transocean, which moved its headquarters from Houston to an offshore location in 1999. BP leased the rig from Transocean, but used an oil industry tax break to write off 70 percent of the rent for the Deepwater Horizon – a deduction amounting to \$225,000 per day since the lease began. This is one lease involving one oil company. But it’s the kind of market dynamic advanced biofuels have to compete with every day.

On the demand side, it is not just a matter of showing up in the marketplace with a cost-competitive fuel. Our vehicles and pumps basically cap the amount of ethanol that can be used in the marketplace, suffocating future demand forecasts and complicating investments in advanced biofuels. The stark reality today is that our companies must go through the oil companies to gain market access, or face having to reinvent the entire supply-chain. Unless the oil companies believe that the new entrants will build production capacity, and ultimately pose a threat to their business, they have little incentive to allow these new companies and their new technologies into the space. This market dynamic, which greatly exacerbates the current cycle of price volatility and massive transfers of wealth from American consumers to OPEC members, is not going to correct itself.

If Americans deserve what we all seem to agree is the ultimate goal – a free and open marketplace in which energy development and innovation can occur – we are going to have to enact policies and incentives to encourage these dynamics to take root.

3) The U.S. government role in innovation dates back more than 100 years, and its engagement in technological development usually stems from an interest in promoting national security and/or enhancing global competitiveness.

While it is true that America’s commitment to free market principles has played a central role in establishing and maintaining our leadership in the global economy, this does not mean that the marketplace did all the work. The development of the oil, coal, natural gas and nuclear industries relied (and rely) very heavily on tax breaks, direct subsidies, and programs designed to reduce investment risk. Similar to the loan guarantee program enacted today for renewable energy, the U.S. government enacted policies decades ago to ensure that the considerable risk associated with using new technologies to drill for fossil fuels was mitigated

so that enterprising new companies and entrepreneurs would not shy away from pioneering new ways to bring energy to the marketplace. The rationale for offering these incentives was very often national security (e.g. World War II, Cold War, etc.) or the desire to maintain and accelerate the global competitive position of the United States. In another example, the foundation of the internet and technology boom – arguably the single largest source of economic growth over the last 15 years – was laid by government research and government agencies like the National Science Foundation (NSF). It is indisputable that the U.S. government played a central role in developing some of the most transformative technological breakthroughs in history, and in most cases, the rationale was strikingly similar to that used to underscore the need to reduce oil dependence.

The alternative, as advocated by some policymakers, is to disengage government from the marketplace. This would require two realities: (1) that we actually disengage the government from the entire marketplace, including the fossil fuels industry; and, (2) that we accept the reality that the market does not value our acute national interest in remaining secure and competitive in the global marketplace.

Recommendations: Accelerating the Commercialization of Advanced Biofuels

As discussed, there are roughly 50 advanced biofuels projects underway in various stages of development. However, meeting the requirements set forth in the RFS will require very rapid commercial scale-up of these and other facilities. It is important to take into consideration the nature of the scale-up process when it comes to an industrial or commodity product.

While many of the cost reductions are achieved through technological development, as is the case for advanced biofuels, the final efficiencies are achieved via commercialization (i.e. the “experience curve”) and economies of scale. There is no better example than corn ethanol. When the corn ethanol industry started building plants, their production costs exceeded their feedstock costs by a large margin. However, corn ethanol producers have reduced their production costs by roughly 60 percent since the first commercial plants were built in the 1980s. Likewise, some solar companies have seen a similar 60-70% production cost reduction in just the last ten years, as capacity has increased significantly. The bottom line is that to bring the clearly demonstrated value of advanced biofuels to market, we need to build commercial plants. And to build plants at the scale necessary to meet the RFS, we need three primary things:

(1) A stable and long-term commitment to help bridge financing gaps

The enactment of the federal Renewable Fuel Standard (RFS) in December 2007 was a landmark achievement for the advanced biofuels industry. It is critical that the RFS not be opened for legislative amendment or administratively weakened in any way, as this would put the entire advanced biofuels industry at risk and send the wrong signal to the marketplace.

There are, however, “front end” challenges in the fuel energy marketplace that the RFS does not solve. The first challenge is that without operating track records, and with new technologies, advanced biofuel producers are unable to leverage low-cost capital. This pushes these companies into a situation where they have to rely on a combination of higher-cost equity (requiring higher and/or more immediate returns) and/or a combination of equity, government engagement and

debt (which is not often available). This market dynamic greatly reduces the pool of available money to finance plants.

This problem is exacerbated by two other factors: (1) the cellulosic ethanol waiver provisions in the RFS, which require U.S. EPA to reduce the mandated volumes of cellulosic ethanol to reflect the amount of cellulosic ethanol production capacity in the marketplace; and, (2) a restricted marketplace, which makes demand forecasting nearly impossible for investors. Both of these factors increase the uncertainty and risk in the marketplace for “next gen” investors.

There are several programs already on the books that are designed to address pieces of the “financing gap” problem. For example, the DOE loan guarantee program is designed to mitigate the front-end investor risk associated with building first-of-kind plants. This program has worked in the instances where it has been administered, and should be accelerated. It has also produced exceptional returns. Every dollar expended by the DOE loan guarantee program has generated an estimated 13 dollars in private sector spending, and the program has created tens of thousands of new jobs. Likewise, the existing cellulosic ethanol producer tax credit (PTC) is designed to attract investors by making the return on investment more predictable and substantial, while the “New Cellulosic Ethanol Biomass Depreciation Allowance (Public Law No: 109-432)” reduces the up-front cost of building a plant.

Unfortunately, none of these programs are dependable from a long-term investment standpoint. The funding for the loan guarantee program has been targeted for spending cuts, which puts existing and prospective projects at risk. Both the PTC and depreciation allowance expire very soon, which means that investors cannot count on these incentives when assessing these companies 5-10 years out into the future. In fact, as case-in-point, the U.S. Department of Energy does not even take these incentives into account when assessing applications for the loan guarantee program.

As a starting point, we recommend that Congress do the following:

- a. Make a clear commitment not to open up the RFS;
- b. Scale up and streamline the loan guarantee program for advanced fuels;
- c. Extend the current tax incentives for advanced biofuels for a time period that reflects the commitment embodied by the RFS;
- d. Explore new and fiscally responsible ways to de-risk the marketplace for advanced biofuels investors and reward performance for producers.

(2) A stable and long-term commitment to increase market access and competitiveness in the U.S. liquid fuel marketplace

The current U.S. transportation fuels marketplace is not open, competitive or price-driven. Current ethanol markets are saturated, as the overwhelming majority of today’s vehicles are only certified to operate on 10 percent ethanol blends. Incremental blend wall increases – i.e. the move to certify E15 – send an important signal to the marketplace and provide some headroom for existing producers, but do little to assuage the increasing sensitivity of advanced biofuel investors to longer-term demand problems. As discussed, this exacerbates the “financial gap” problem by increasing uncertainty, which in turn ramps up the cost of capital for facility

construction and shrinks the pool of available funding for the financing of advanced ethanol facilities.

The well-discussed solution to this problem is the aggressive deployment of flex-fuel vehicles (FFVs) and blender pumps, which would allow the consumer owning an FFV to choose the percentage of ethanol blended into each gallon of gasoline based on price or personal preference. Any discussion about FFVs and blender pumps leads to a “chicken or the egg” problem, in which automakers do not want to produce FFVs without blender pumps, and station operators do not want to invest in blender pumps if the cars are not available. The relative cost of producing an FFV (~\$100 per vehicle) is far lower than the relative cost of purchasing and installing a blender pump, and U.S. automakers already produce FFVs for Brazilian auto markets for little (if any) discernable extra cost. The evolution process must start with the vehicles.

(3) No backsliding

It is absolutely critical that current programs supporting the production and use of biofuels are not discontinued or allowed to expire. This is important for two reasons: (1) these are early-stage companies that need time to realize the advantages reaped by incumbents, which include decades of public investment in infrastructure and government support, fully depreciated plants, economies of scale and operating track records that afford access to low-cost capital; and, (2) the lack of consistency and durability in U.S. alternative fuels policy is a major problem undercutting efforts to scale-up the advanced biofuels industry.

There are several examples:

- The USDA and DOE loan guarantee programs have been very successful and cost effective where administered, but the available funding has been cut on repeated occasions, almost from the inception of the programs. The program is under consideration for cuts yet again, while there is little discussion about government support for oil companies.
- The biomass to energy titles in the 2008 Farm Bill, including the Biomass Crop Assistance Program, are very useful for reducing the feedstock cost of producing advanced biofuels. These programs are due to expire.
- There are various tax incentives very similar to those offered to the fossil fuels industry, including the producer tax credit for cellulosic ethanol and the accelerated depreciation allowance offered to certain eligible biorefineries (discussed above). Both incentives are scheduled to expire at the end of next year, and therefore cannot be relied on by investors and developers.

As a starting point, we recommend that Congress do the following:

- a. Make a clear commitment not to open up the RFS;
- b. Protect, scale up and streamline the loan guarantee program for advanced fuels;
- c. Work with the advanced biofuels industry to identify and protect critical and cost-effective farm bill titles;

- d. Extend the current tax incentives for advanced biofuels for a time period that reflects the commitment embodied by the RFS.

Conclusion:

The public debate about biofuels is almost always robust, but not always rooted in fact. It is a debate that often loses the forest for the trees, and focuses on the immediate-term discomforts of change rather than the longer-term potentially catastrophic impacts of not changing.

The reality is that the current ethanol industry has achieved what it was asked to achieve, while extending supply and mitigating gas prices. But more important for us, they have demonstrated the viability of ethanol in the marketplace as scale, which is tremendously helpful to the advanced ethanol industry when it comes to reducing risk and securing investment.

The advanced ethanol industry is in the first stages of building on the market established by conventional ethanol. What we need to meet expectations is the same type of tax treatment that the oil industry has enjoyed for decades, and an aggressive program to open the marketplace for the increased use of ethanol. It will benefit everyone to bring consumer choice to the pump. It will allow ethanol to excel when price competitive with gasoline, and vice-versa. It will open the door to the development of more ethanol production, and other advanced biofuel production, from different feedstocks and new technologies. It will allow consumers to choose how much ethanol they use, freeing the industry from many of the concerns heard today. This is what we all want.

The alternative is grim. The costs of relying on foreign sources of energy are starting to mount. We are falling behind in the global race to be exporters rather than importers of the next generation of energy technologies and know-how. China spends nearly \$12 billion per month on clean energy development. According to U.S. Commerce Secretary Gary Locke, "[t]hey're doing this because they really want to be the world's supplier of clean energy and they recognize this will support millions of jobs."

The advanced ethanol industry is not looking for handouts. It is looking for a level-playing field and a durable, predictable and cost-effective policy commitment to advanced biofuels over time. If this happens, we will bring tremendous value to the marketplace and to American consumers.

Thank you for the privilege of speaking before you today. I look forward to your questions.

Addendum A
Estimations of Various Advanced Ethanol Production Cost Scenarios

Cost of production data is considered trade protected by advanced biofuels companies. However, several experts, including those at NREL, have published estimates of the costs of emerging advanced ethanol production, in a hypothetical “nth plant” (i.e. mature plant) scenario.

These estimates vary widely based on the assumptions used, and should only be considered general estimates of the production cost of advanced ethanol. But together these data points offer a framework for understanding the relative costs of petroleum, ethanol, advanced ethanol and other fuels, and the value proposition at hand. Wholesale gasoline is currently trading at \$3.19 per gallon; corn ethanol is currently trading at \$2.61 per gallon (April 11th, 2011).

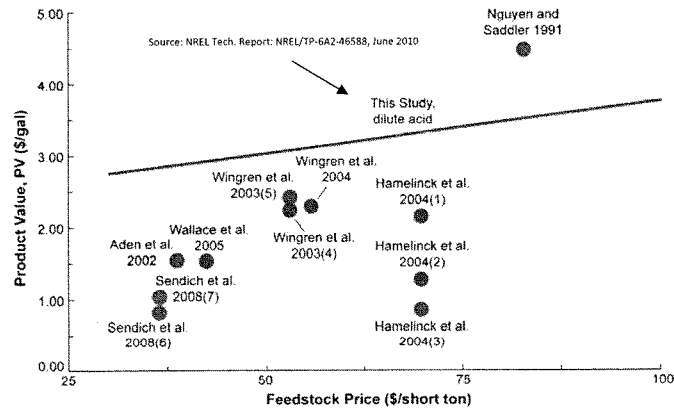


Figure 14. Ethanol cost estimations from previous techno-economic studies.
 (1) Short term technology—Simultaneous saccharification and fermentation (SSF). (2) Middle term technology—Simultaneous saccharification and cofermentation (SSCF). (3) Long term technology—Consolidated bioprocessing (CBP). (4) Separate hydrolysis and fermentation (SHF). (5) SSF. (6) CBP. (7) SSCF.

Addendum B
Discussion of Food vs. Fuel Issue

Background

Food versus fuel is a term used to suggest that the increased production of biofuels has caused food prices to increase. The theory is that using grain for fuel increases the demand for grain, which in turn drives up grain prices and increases the cost of producing or gaining access to food. The food versus fuel headline is important to all biofuel sectors because its chief proponents are using the theory to underpin an effort to rollback or curtail the federal Renewable Fuel Standard (RFS), which requires the use of a wide variety of conventional and advanced biofuels.

Discussion

From 1974 to 2005, real food prices (adjusted for inflation) dropped by roughly 75 percent. From 2005 to 2008, food and grain prices increased steadily. During this period, both the price of oil and the use of ethanol rose significantly. These correlations led to a robust public debate, starting in 2008, about whether ethanol or oil was the primary cause of food and grain price increases.

Recent events greatly inform the food versus fuel debate. After increasing sharply, oil prices dropped dramatically in late 2008 and 2009. During the same period, the Consumer Price Index (CPI) for groceries showed the steepest year-over-year decline since 1950, with the Bureau of Labor Statistics citing the 27.3 percent decline in the energy index as the primary cause. And as food prices declined steeply in 2009, biofuel production continued to increase to record levels. In sum, since the inception of "food versus fuel" in 2008, the correlation between oil price and food price has continued, while the brief correlation between ethanol use and food price has broken.

There are other facts strongly suggesting that the food versus fuel theory is overblown:

- Corn is well-supplied. U.S. agriculture has doubled its production of corn over the last thirty years while expanding corn acreage by only 3 percent.
- U.S. agricultural exports have not decreased as grains have allegedly been "diverted" to biofuel production. In most cases, they have increased.
- A recent campaign called FoodPriceTruth.org revealed that profit margins among the major food producers in the United States (e.g. Kraft, Cargill, etc.) increased significantly, in some cases more than 100%, during a time when their major trade association, the Grocery Manufacturers Association (GMA), blamed biofuels for price spikes.

The purpose of the food versus fuel campaign appears to be to roll back the clock on corn ethanol to facilitate a reduction in grain prices (to the benefit of GMA-member profit margins). There are several problems with this approach: (1) biofuel critics want to open and amend the RFS, which would cause great harm to the advanced biofuel industry; (2) the correlation between ethanol use and food prices does not exist to any significant degree, which suggests that reducing ethanol use would not provide food price relief; and, (3) using less renewable fuels will increase fuel prices, according to Merrill Lynch and others, which is the primary cause of food price increases.

Addendum C
Government Support for the Fossil Fuels Industry

The United States government provides a large subsidy to oil companies, with major tax breaks at virtually every stage of oil exploration and extraction. A large percentage of these incentives do not expire. Eliminating the bulk of these subsidies would not be disruptive to the economy because the oil industry is mature and highly profitable.

Some common examples include:

- A recent study showed that fossil fuels received 70 percent of U.S. federal energy subsidies between 2002 and 2008, to the tune of more than \$70 billion during this time period. This number does not include the loopholes in oil and gas laws that, according to the Government Accountability Office (GAO), allowed petroleum companies to forego paying \$53 billion in royalty payments, over just four years, for extracting natural resources from lands owned by the American taxpayer (source: ELI, 2009)
- Capital investments, such as oil field leases and drilling equipment, are taxed at an effective rate of 9 percent, which is far lower than the standard rate of 25 percent and lower than virtually any other industry. For many small and midsize oil companies, the tax on capital investments is so low that it is more than eliminated by various credits (i.e. the company returns on those investments is higher after taxes than before)
- Many small and midsize U.S. oil companies can claim deductions for the lost value of tapped oil fields far beyond the amount the companies actually paid for the oil rights
- Construction bonds at low interest rates or tax-free
- Research-and-development programs at low or no cost
- Assuming the legal risks of exploration and development in a company's stead; for example, the oil industry received \$2 billion in incentives to explore and develop unconventional sources of oil.
- Below-cost loans with lenient repayment conditions
- Income tax breaks
- Sales tax breaks - taxes on petroleum products are lower than average sales tax rates for other goods
- Development assistance received from international financial institutions (the U.S. has given tens of billions of dollars to the World Bank and U.S. Export-Import Bank to encourage oil production internationally).
- The U.S. Strategic Petroleum Reserve
- Construction and protection of the nation's highway system
- Up to \$100 billion annually securing the loading and safe passage of oil tankers in foreign countries (i.e. securing the virtual maritime oil pipeline).

**Environment and Public Works Committee Hearing
March 9, 2011
Follow-Up Questions for Written Submission**

Questions for Coleman

Senator Thomas R. Carper

1. Many of you speak about advanced biofuels demonstration projects that are underway. Can you please shed some light on when customers might see these fuels available at the pump? What is a realistic timeframe for their coming to market on a commercial scale?

As a general matter, the advanced biofuels industry has a bright future if Congress maintains and continues to develop a stable policy framework in support of the industry. For more than 100 years, public policy has been the cornerstone of industry development for every major energy sector in this country. For example, the U.S. government was directly responsible for the early development of the oil and natural gas industry by enacting legislation that de-risked the initial investment in, and use of, new technologies in the oil and natural gas extraction sector. Most of these oil and gas incentives still exist today, and are being used for oil and gas development projects currently underway. If Congress continues to stand behind new fuel technologies, they will begin to emerge at commercial scale over the next few years.

With regard to advanced biofuels, there are roughly 50 advanced biofuel projects in the United States at various stages of development. This number includes all types of advanced biofuels, including but not limited to cellulosic ethanol, advanced ethanol, bio-butanol, and biomass-based diesel. Of these roughly 50 projects, there are at least a dozen projects that have all the project finance pieces in place and are proceeding as scheduled. There are another dozen or so projects underway that have largely all the pieces in place, but are working on final approval with a key partner (e.g. a Department of Energy loan guarantee, a private sector equity partner, etc.). The remaining two dozen or so projects are substantively underway – in many cases already sited and moving forward – but are at an earlier stage. These projects are moving forward despite current economic conditions in the United States, which make debt/project financing extremely difficult.

The Advanced Ethanol Council (AEC) represents cellulosic and advanced ethanol companies (i.e. a subset of the larger advanced biofuels industry). We are beginning to see this industry emerge. For example, AEC-member company Inbicon is selling cellulosic ethanol to approximately 100 filling stations owned by Statoil in Denmark, which is being sold in E5 (5% ethanol) blends. The company is now focusing on the United States, where it is engaged in negotiations to commission two plants with 20-40 million gallons of annual cumulative capacity in 2013. Another AEC company – Iogen – has already marketed cellulosic ethanol through its partner Shell. Several other AEC-member companies are in the final stages of project development. AEC members alone have demonstration or first-commercial projects underway in at least 12 states. Overall, there are at least 10 cellulosic/advanced ethanol projects that have all or largely all of the pieces in the place to build first-commercial scale production facilities. Many of these facilities are scheduled to produce fuel for sale in 2013.

In assessing the ongoing commercial viability of the advanced biofuels industry, it is extremely important to understand what is delaying commercialization. As a general matter, the technology is proven, and the final step of commercial development is realizing the efficiencies gained by building commercial plants and perfecting operations at commercial scale. As discussed in written testimony submitted by the AEC, the challenge is two-fold: (1) as was the case, and continues to be the case with the oil and gas industry, there is tremendous up-front cost and risk to producing next-generation energy of all types; and, (2) we are producing to a marketplace that does not operate on the market fundamentals of rewarding cost-competitiveness and innovation. As such, while the advanced and cellulosic industry has the technology and value proposition to commercialize its fuel, its ability to do so (and the timing therein) will continue to depend on steadfastly maintaining current policy commitments (e.g. the federal Renewable Fuel Standard), extending current and expiring tax incentives for advanced biofuels that are already offered to incumbent energy sectors in perpetuity, and continuing to develop energy policy that rewards domestic production and innovation. However, it is important to note that once the technology is proven at first-commercial scale, the replication and ramp up process for significant commercial production can occur very quickly. This is what happened in the corn ethanol space, when the industry was able to grow at a rate of 1.5 billion gallons per year.

In sum, there are dozens of viable advanced biofuels projects already underway with tremendous economic upside for the United States and the regions where they are located. We expect to see product availability in the 2013 timeframe. And we look forward to working with the Senate Environment and Public Works Committee to ensure that our industry reaches its full potential.

Senator WHITEHOUSE. [presiding.] Thank you very much.

This has been a very helpful and instructive panel. Because we are coming up on this April 15th moment in Shenandoah, IA where we are doing the expansion of the plant to grow algae off of the exhaust of the ethanol plant, I am interested in asking each of you what role you see algae biofuels as playing in the advanced biofuel mix.

Why don't I start with you, Mr. McAdams?

Mr. MCADAMS. It is a very important role. I would, I want to point out to the committee there are various, different ways in which algae can be used to make a biofuel. There are some that not so elegantly describe it as the squish, which is where you grow as efficiently as you can a lipid with high concentrations of oil, and then you remove the oil and then put it through a secondary process to make a traditional drop-in fuel. There are other heterotrophic algae processes which do not use sunlight or CO₂, but use it as a mechanism in a fermentation process.

We represent both types. We have Sapphire, who is going to deploy in New Mexico, and we have Solazyme, who has just gone out with their IPO. So, these are very promising technologies and they certainly have a place in backing out foreign oil in the future.

Senator WHITEHOUSE. Thank you.

Mr. Koninckx.

Mr. KONINCKX. We do some work in algae. We focus on cellulosic ethanol and on butanol because the cellulosic ethanol, of course, on corn stover, where we see a feedstock that exists today and that is accessible today and that we can grow immediately. Butanol, butanol is a technology that we can apply in the existing ethanol industry, converting the industry to a more valuable product.-

So, obviously there is long-term potential for algae and we do some research work in it. But we focus right now on cellulosic ethanol and butanol which we, as I stated before, expect to commercialize in the near term.

Mr. KISER. Senator, we are happy to build an engine to run on anything. Give us the appropriate lead time, your make sure the certification fuel of the EPA matches and the fuel is in the marketplace, we are happy to do it. We are currently testing isobutanol with a couple of our engine manufacturers. It does not act as an alcohol. The challenge with ethanol, you are burning it with gasoline, and it is a challenge.

So, there are biofuels that thus far show tremendous promise. But—

Senator WHITEHOUSE. The lipid technology that Michael McAdams was talking about comes through just as oil, not as ethanol.

Mr. KISER. We do not have a problem with it.

Senator WHITEHOUSE. Mr. Faber.

Mr. FABER. Senator, all I will say is that we support any of these fuels that do not pit our food security needs against our energy security needs. So, anything that can accelerate the development of fuel feedstocks that do not divert food and feed into our fuel supplies would be a terrific development.

Senator WHITEHOUSE. Mr. Coleman, if you could add, since you are here on behalf of the ethanol folks. It seems to me that there

is a fairly healthy relationship between the algae industry and the ethanol industry and that the algae industry is able to absorb and put to use what would otherwise be carbon dioxide emissions produced in the course of the development of the ethanol. Correct?

Mr. COLEMAN. That is true.

Senator WHITEHOUSE. It is symbiotic.

Mr. COLEMAN. Yes. You are hitting on a couple of points. I am a great believer in the continuum theory, that this renewable fuels industry will continue to evolve. Someone producing ethanol from corn, when corn goes to, if there is one thing I have in common with Scott it is that high corn prices can be a problem at the production level, right? So, corn ethanol folks see \$7 corn they look for alternative feedstocks. So they have an interest in not only sequestering carbon, but also figuring out other ways to produce their product.

When you grow algae, you can produce oil and you can produce ethanol from the biomass that you are producing. So that is a huge benefit. The other one, and this is the most important one for your company, is that it is tricky to finance a plant no matter what type of energy source you are.

When you develop your technology, it is tremendously helpful to reach out to people that have already that steel in the ground and say, we have an option, we have a bolt on solution that will help you in three different ways.

So, that is a huge issue for us.

Senator WHITEHOUSE. Very good.

Senator Inhofe.

Senator INHOFE. Thank you, Mr. Chairman.

You now, I was the guy who requested this hearing and this has been actually better than I thought it would be. We have gotten some great responses.

Now, I want to give you, I do not think I need Mr. McAdams and Mr. Koninckx to tell you that I am a strong supporter of cellulosic. My only thing, in the legislation that I have, is purely corn ethanol, it does not reflect anything else.

Look at our State of Oklahoma. Switchgrass. Look what the Noble Foundation is doing. Look at Oklahoma State University. We are a big player in this. So, I want to make sure everyone understands that I am on your side on that.

I think you did a good job, Mr. Faber, in talking about the costs. We quite often, and you specifically talked about the CBO and their numbers as to what it is going to cost in terms of increased fuel costs.

One thing that was not discussed, and I will go back to you, Mr. Kiser, on this, that concerns me, I suspect that of all of the 100 Senators, I use chainsaws more than anybody else does. I pride myself every weekend in doing something that I know that no other U.S. Senator is doing. So, I cut down the trees and I split all the woods for all 20 of my kids and grandkids. So, I know something about that.

Now, we know what can happen in terms of damage, let us say, in a chainsaw. Someone is putting in a blend that is damaging it, causes it to stick, it stays on, and with today's tort laws and all of that, have you ever looked at how this is going to affect people

in terms of safety but then, connected to that, the lawsuits that could come up? I mean, with a chainsaw, it is easy to lose your life. You know what the tort system is out there.

Any thoughts about that?

Mr. KISER. Certainly. Senator, we are acutely aware of this problem. We are consumer products companies. Our names are on those things. We care about our customers' safety. In particular, a chainsaw, and any open clutch-to-blade equipment, you have hit it right on the head, is alcohol advances the RPMs. The machine thinks it is throttling up and the blade will move, simply move, when it is in neutral.

So this presents a very real safety problem for any user, whether it is seated, I mean, if you have ever watched a professional forester, they throw these things around like handbags. They carry them up and down trees and hang them on themselves.

So it is a huge problem. It is a warranty issue as well. But when the warranty expires, our liability does not go away.

Senator INHOFE. Exactly.

Mr. KISER. You also potentially face a recall. These are company-crushing endeavors. If this fuel is in the marketplace, and it is x dollars, and EPA knows what those numbers are that trigger misfueling, and if you can foresee that the product might be misfueled and an injury may result, you may have to recall the product.

Senator INHOFE. Well, not just recall the products, but if something happens, everyone is talking about it and you made the statement, you can produce anything to burn on anything.

Mr. KISER. That is right.

Senator INHOFE. But those things are still out there. In 1994, I was the, I guess, the reason that we passed the 18-year repos on aviation products and that put America back into an exporting position instead of importing on airplanes and airplane products. Well, that was great. It was 18 year repos.

Now, you might say, wait a minute, something has been running fine for 18 years, it should not go beyond that. However, if you find somebody that does run on something that you are forced to buy, there are still going to be thousands and thousands of those out there that are going to come back to you, your manufacturer, long after, years after they have been performing well, just due to the blend that they are—

Mr. KISER. Yes, sir.

Senator INHOFE. Am I off base on that? Am I missing something?

Mr. KISER. It is in the millions. In the marine industry, if your machine, if your engine fails and you are 30 miles offshore, this is a huge problem. If you are on a snow machine and it fails in the wilderness, this is a huge problem.

So, again, we are not anti-ethanol. We are not opposed to these fuels. But we want to educate that if this fuel is going to be in the marketplace, you have to educate the folks about how, what fuel goes in what and, in particular, a blender pump.

Senator INHOFE. Yes, I would only correct you in saying you can educate them all they want, but if they end up losing their lives, all the education in the world is not going to help that.

In Oklahoma we still now, it may not last long, but as it is now we have a choice. In Oklahoma there are big signs on every major filling station, we sell no ethanol, no corn in our gas. That is all over the place. So while the supply and demand varies from State to State, I can assure you in Oklahoma what it is.

So, I would assume then, if we had an opportunity to opt out, keeping in mind now, I say to our friends on the left side here, this only affects corn ethanol, nothing else. If there is an opportunity to opt out of this, and I would say the same thing to you, Mr. Faber, would that not pretty much solve this problem? It is choice. If you want any kind of ethanol you can have it, but if you want clear gas you can have that, too.

Mr. FABER. I think to your point, and to the question that Senator Johanns asked, FAPRI, which is in some respects the final word on agricultural economics, has looked at this question of what if you change the mandate, eliminate the mandate, eliminate the tariff, eliminate the tax credit, and what would happen to ethanol production?

There would still be a significant amount of ethanol production, depending on the year, but there would not be as much. The price of ethanol would be lower. The price of corn, and ultimately the price of food and feed, would be lower. So, you would continue to have a mature industry that would be competitive with other makers of fuels. You just would not be spending \$6 billion a year in subsidies and limiting consumer choice.

Senator INHOFE. Americans can have the choice. This is the thing that has been different in America than in any other country.

Thank you, Mr. Chairman.

Senator WHITEHOUSE. Thank you.

I just wanted, before I, do you want to do another round or are you ready to conclude?

Senator INHOFE. I am ready to conclude.

Senator WHITEHOUSE. OK. Let me just ask one last question of Mr. Kiser. I take the prerogative of the Chair, since I am also Senator from the Ocean State, and give you the opportunity to elaborate just a little bit on your remarks with regard to marine use of the fuel and what your recommendations are with respect to the particular issues that marine use and saltwater use of the fuel raise.

Mr. KISER. I would note that the National Marine Manufacturers is a co-participant with OPEI on both the petition to ask EPA to make a formal rulemaking on misfueling, to look at misfueling mechanisms beyond the label to help educate folks. The National Marine Manufacturers Association was also one of the petitioners with us in challenging the decision. I note that the Coast Guard weighed in in opposition to the E-15 waiver because of its potential effect in the marine industry.

Their engines, like our own, are simply not designed for the product. They can design a product for it. Now, they are a little more challenged because alcohol absorbs water. You bring water into the engine, a, it is corrosive, but it also phase separates. So, they are uniquely challenged. Probably of all the non-road community, marine has a very tough road here and certainly maybe in the marina

environment or in ocean environments, a legacy fuel or an easy or neat fuel should be made available for the foreseeable future.

They also have a very long lifetime span. Legacy products in my field, maybe 10 or 20 years. You have boats, 30, 40, 50 years old, same thing with automobiles, legacy automobiles, that are collectibles. None of this stuff is designed for, and especially a fiberglass tanked boat. You simply cannot run E-10 in it. It will break up the resin. So, the marine folks are genuinely challenged here.

Mr. COLEMAN. Mr. Chair, could I comment on that before you finish?

Senator WHITEHOUSE. Sure.

Mr. COLEMAN. From the perspective, just quickly on this choice thing, from the perspective of the advanced ethanol industry with regard to opt out, I think the common ground here is we want to give consumers a choice. We want to give them a choice not just to opt out, but to opt in, because if you give them a choice just to opt out, you are going to have a situation where you weaken the existing industry.

There is a plant in Southwestern Kansas right on the border on Oklahoma, they are going to do a cellulosic ethanol biofuels plant. It is an integrated plant but it is financed on the back of a company that is healthy because they are selling corn ethanol. So we do not want to weaken the ethanol industry while we move toward choice.

I think the ultimate situation is where the consumer can dial it up to 30 or 40, but then they can dial it down for zero if they want to go offshore. I am a boat owner and I can certainly sympathize with that. But we need to work on opt up and opt down.

Senator INHOFE. Well, that sounds good. The only problem with that is we are right up against the blend wall in my State of Oklahoma today. I mean you can always opt up. The point is what you cannot get is clear gas. You can now. But as we get closer to that wall, we see that time coming to an end.

I am not going to subject my farmers, some people do not realize, you commented you are a coastal State. Oklahoma has more miles of freshwater shoreline than any State of all 50 States. Not many people realize that. So, it is a huge industry there.

Well, anyway, thank you, Mr. Chairman.

Mr. MCADAMS. Mr. Chairman, I just wanted to make one comment in the other direction. That is as you see these new molecules and the advances in cellulosic coming into the market, they are different than the molecules we have used in the past.

So what you have, the oversight function in this committee is attached to the Clean Air Act. EPA, moving forward, is going to have to prove, under Tier 1 and Tier 2, the gasoline molecules that come into the market. They are also going to have to approve, under the RIN certification procedures, whether the feedstocks, processes or products fit under the definitions of the RFS II.

So, through your oversight, you need to be very careful because our regulatory structure, driven by the Clean Air Act for gasoline and diesels, has predominantly been skewed for ethanol and biodiesel up to this point because that is where the volumes have been. We need to have a regulatory framework harmonized with

the intention of the RFS II, moving forward, so we can deploy these new molecules.

Thank you.

Senator WHITEHOUSE. All right. Well, I thank the witnesses very much.

I want to thank the Ranking Member for his leadership and pulling this hearing together. I agree with him that it has been very helpful and instructive.

Once again, I thank all of the witnesses.

I think we will leave the record of the hearing open for an additional week in case anybody wishes to add anything. But subject to that 1-week for the record, the hearing is hereby adjourned.

[Whereupon, at 11:55 a.m., the committee was adjourned.]

[Additional statements submitted for the record follow.]

STATEMENT OF HON. THOMAS R. CARPER, U.S. SENATOR FROM THE
STATE OF DELAWARE

As many of you know, next week is the 41st anniversary of Earth Day, a day that is near and dear to my heart. Next week is also another anniversary—one that is far more tragic—the 1-year anniversary of the BP/Deepwater Horizon oil spill. I think that today, more than ever, Americans understand the need to develop domestic sources of renewable energy, and the need for us to become energy independent. Energy independence is something that we have talked about in this country for a long time.

Today's hearing provides us with an opportunity to assess if we are indeed meeting some of the key time-tables and targets that were established in 2007 to put us on a path toward energy independence. Appropriately named, the Energy Independence and Security Act of 2007 established a second phase in the EPA's Renewable Fuel Standards program that increased the demand for second generation biofuels. These new biofuels were to be cleaner in emissions and were to be made from renewable materials other than food stocks such as corn. I supported this effort because I believe biofuels done right are a good thing. Biofuels can give us an environmentally friendly option to move away from foreign fossil fuels and safeguard our energy security.

However, since 2007 we've not seen the increases in next generation biofuels as we had hoped. This country continues to depend on biofuels that compete with our food supply and may be impacting our air quality. Many of you here have heard me say that I believe the role of government is to steer the boat, not row the boat. Today, we will be grading our driving skills to see, are we steering in the right direction toward energy independence? Today, we will ask if the government is providing the right incentives to spur investment and production of the next generation of biofuels. Are we providing the certainty businesses need to invest in the new technology that we lead us to these new fuels?

I look forward to hearing from our witnesses to see what advances have been made and what the government could do better to help our companies develop better biofuels. I'm also interested in learning how our current renewable fuel standard has impacted all-aspects of our economy and our air quality.

In closing, I believe the Renewable Fuels Standard must be implemented in a manner that positively impacts energy security, the environment and the economy. I look forward to working with my colleagues on this committee to make sure this happens. Madame Chair, thank you. And, to our witnesses today, welcome.

OVERVIEW –IMPACTS OF MID-LEVEL ETHANOL ON-ROAD AND NON-ROAD ENGINES AND EQUIPMENT (PREPARED BY DR. RON SAHU, MAY 15, 2009)

A. Change Due to the Enleanment Effect of Ethanol

Gasoline is a mixture of many hydrocarbon compounds that consist mainly of hydrogen and carbon.¹ Ethanol also contains hydrogen and carbon – but, in addition, it also contains oxygen. The exact air-to-fuel ratio needed for complete combustion of the fuel (to carbon dioxide and water vapor) is called the "stoichiometric air-to-fuel ratio." This ratio is about 14.7 to 1.0 (on weight basis) for gasoline. For ethanol/gasoline blends less air is required for complete combustion because oxygen is contained in the ethanol and because some of the hydrocarbons have been displaced. For example, for E10 the stoichiometric air-to-fuel ratio is 14.0 to 14.1 pounds of air per pound of fuel. Indeed, the stoichiometric air-to-fuel ratio for straight ethanol is 9 to 1 so that as the proportion of ethanol in the gasoline blend increases so must the air-to-fuel ratio decrease. To deliver the required power for any given operating condition, engines consume enough air and fuel to generate the energy required, to the limit of the engine's capabilities. Because fuel delivery systems are designed to deliver the prescribed amount of fuel on a volume control basis the fuel volume delivered is related to the volume of air introduced. The engine design anticipates that the fuel utilized will match the air-to-fuel ratio characteristics utilized in the engine design and calibration. Because ethanol blended fuels require more fuel for the same amount of air to achieve stoichiometric conditions, the fuel system must adapt by introducing more fuel or the desired mixture is not achieved. If additional fuel is not introduced to compensate for the ethanol the resulting mixture has less fuel than desired; the effect of this type of fuel change on an engine is called "enleanment."

¹ Sulfur, nitrogen, and trace elements also may be present.

Even with closed-loop systems, where the engine has a control system that can detect and compensate for the effects of ethanol addition (adapt), if the fuel contains an amount of ethanol that is outside the range of the system design, the engine similarly may receive too much oxygen and operate in a lean condition. Lean operation can lead to a variety of performance problems, for example the combustion and exhaust gas temperatures will be higher, engine starting may become more difficult, and the engine speed control may become inaccurate.² These problems may result in the unintentional engagement of cutting chains and blades on chainsaws and other products – because the engines driving these products will run at higher speeds, especially at idle conditions.

The increased combustion and exhaust gas temperatures resulting from lean operation can result in severe damages to pistons, gaskets, catalysts and emissions-related components, in turn, resulting in the failure of the product to operate and increased exhaust emissions.³ These increased temperatures can also damage and destroy critical safety components like spark arrestors – as required by the U.S. Forest Service to be used on chainsaws to reduce fire risks.

B. Effect on Exhaust Emissions

Enleanment and the increased heat from mid-level ethanol blends will cause heat-related damage to the engine over its useful life, which can cause dramatic increases in hydrocarbon emissions. NOx emissions from conventional products and vehicles generally increase

² Issues associated with driveability and operational problems have been discussed for on-road vehicles and for off-road equipment in a series of reports in 2002-2004 by Orbital Engine Company for a biofuels assessment conducted in Australia. In particular, see (a) A Testing Based Assessment to Determine Impacts of a 10% and 20% Ethanol Gasoline Fuel Blend on Non-Automotive Engines, January 2003; (b) Marine Outboard Driveability Assessment to Determine Impacts of a 10% and 20% Ethanol Gasoline Fuel Blend on a Small Batch of Engines, February 2003 and (c) A Testing Based Assessment to Determine Impacts of a 20% Ethanol Gasoline Fuel Blend on the Australian Passenger Vehicle Fleet – 2000hrs Material Compatibility Testing, May 2003.

³ Id.

immediately since enleanment creates conditions which increase NOx.⁴ For less sophisticated open-loop engines, NOx emission increases can be dramatic.

While some of the toxics in exhaust emissions show expected decreases in the presence of ethanol, some toxics, such as aldehydes, can show increases. Besides the potential toxic effects of aldehydes in exhaust gases, the aldehydes act as an ozone precursor and increase the smog-forming potential.

C. Effect on Water Solubility and Phase Separation

Separation of a single phase gasoline into a "gasoline phase" and a "water phase" can occur when too much water is introduced into the fuel tank. Water contamination is most commonly caused by improper fuel storage practices at the fuel distribution or retail level, or the accidental introduction of water during vehicle refueling. Water has a higher density than gasoline, so if water separates, it will form a layer below the gasoline. Because most engines obtain their fuel from, or near, the bottom of the fuel tank, engines will not run if the fuel pick up is in the water-phase layer.

Typically, gasoline can absorb only very small amounts of water before phase separation occurs. Ethanol/gasoline blends, due to ethanol's greater affinity with water, can absorb significantly more water without phase separation occurring than gasoline. Ethanol blends can actually dry out tanks by absorbing the water and allowing it to be drawn harmlessly into the engine with the gasoline. If, however, too much water is introduced into an ethanol blend, the water and most of the ethanol will separate from the gasoline and the remaining ethanol. The amount of water that can be absorbed by ethanol/gasoline blends, without phase separation, varies from 0.3 to 0.5 volume percent, depending on temperature, aromatics, and ethanol content.

⁴ The higher combustion temperatures and the excess of oxygen in the combustion chamber result in the excess oxygen combining with nitrogen to produce nitrogen oxides.

If phase separation were to occur, the ethanol/water mixture would be drawn into the engine and the engine would most likely stop.

In some situations, ethanol/gasoline blends might absorb water vapor from the atmosphere, leading to phase separation. Such problems are of greater concern for engines with open-vented fuel tanks that are operated in humid environments, such as marine engines.

Additionally, more complex phenomena such as lubricating oil/fuel separation (in 2-stroke engines) and temperature-induced phase separation of various fuel components have also been noted.

D. Effect on Material Compatibility

A variety of components in engine/equipment systems can come into contact with the fuel. These include

- Fuel Lines
- Fuel Tanks
- Fuel Pumps
- Fuel Injectors
- Fuel Rails
- Carburetors (and internal components)
- Pressure Regulators
- Valves
- O-Rings
- Gaskets

Materials used in these components should be compatible with the full range of expected fuel composition. Table A shows the types of metals, rubbers, and plastics that are used in existing engines and fuel system components currently designed to run on E10 fuel blends.

Table A – Illustrative Materials Used in Engines and Fuel Systems**Table A****A. Metals**

Aluminum (various grades)
 Brass
 Carbon Steel
 Cast Iron
 Copper
 Magnesium (and alloys)
 Zinc (and alloys)
 Lead
 Tin
 Terne Plate
 Solder (tin/lead)
 Other metals and alloys

B. Rubbers

Buna N
 Silicon Rubber (VMQ)
 HNBR (Hydrogenated Nitrile Butadiene Rubber)
 Others

C. Plastics/Polymers/Monomers/Elastomers

Hydrin (epichlorohydrin)
 H-NBR (copolymer from butadiene and acrylonitrile)
 Low Temp Viton (FKM) grades such as GFLT
 Nylons (various grades)
 Polyester urethane foam
 NBR with 16% PVC and 32% ACN content
 Ozo-Paracril (blend of PVC and nitrile rubbers)
 CSM - Chlorosulfonated polyethylene, such as Hypalon
 FVMQ - Fluorosilicone
 HDPE – High Density Polyethylene
 PS - Polysulfone
 PC - Polycarbonate
 ABS - Acrylonitrile Butadiene Styrene
 EVOH -Ethylene Vinyl Alcohol
 PPA - Polyphthalamide
 PBT - Polybutylene Terephthalate
 PE - Polyethylene – High Density Polyethylene (HDPE),
 PE - LDPE Low Density Polyethylene (LDPE)
 PET - Polyethylene Terephthalate (Mylar)
 PP - Polypropylene
 PPS - Polyphenylene Sulfide
 PUR - Polyurethane
 PVC - Polyvinyl Chloride
 PEI - Polyetherimide (GE Ultem)
 POM - Acetal Copolymer
 HTN - DuPont™ Zytel® HTN
 PTFE - Polytetrafluoroethylene (Teflon)
 POM - Polyoxymethylene (acetal/Delrin)
 Fluorosilicone

Others

This is not an exhaustive list and is meant as an illustration of the diversity of materials used presently. Based on existing studies, it is clear that several rubbers and elastomers can swell and deteriorate more rapidly in the presence of ethanol.⁵ Ethanol also corrodes certain metals. Corrosion occurs through different mechanisms including acidic attack, galvanic activity, and chemical interaction. The first is caused by water in the fuel. Ethanol attracts and dissolves water, creating a slightly acidic solution. Unlike gasoline, ethanol alone or combined with water conducts electricity; this conductivity creates a galvanic cell that causes exposed metals to corrode. So when ethanol is blended with gasoline the resulting blend is conductive and the conductivity increases as the amount of ethanol is increased. The addition of ethanol greatly increases the ability of gasoline to dissolve ionic impurities which can facilitate corrosive attack of many metals. Another mechanism is direct chemical interaction with ethanol molecules on certain metals.

Clearly, deterioration of materials would result in loss of function of critical engine components, resulting in fuel leaks, fires from fuel leaks, and equipment failure. This has obvious safety implications.

E. Effect on Evaporative Emissions

Permeation of fuel through elastomers can result in deterioration of these materials. In recent testing, all of the tested ethanol blends showed higher permeation rates through elastomers

⁵ A Testing Based Assessment to Determine Impacts of a 20% Ethanol Gasoline Fuel Blend on the Australian Passenger Vehicle Fleet – 2000hrs Material Compatibility Testing, May 2003 and A Testing Based Assessment to Determine Impacts of a 10% and 20% Ethanol Gasoline Fuel Blend on Non-Automotive Engines - 2000hrs Material Compatibility Testing, May 2003.

than conventional gasoline.⁶ An important emissions concern that remains poorly understood is ethanol's ability to permeate through rubber, plastic, and other materials used widely in the fuel tank, fuel system hoses, seals, and other parts of the fuel handling system. Recent studies have shown these emissions can be quite significant.⁷

F. Impacts Associated with Fuel Volatility

Mid-level ethanol gasoline blends are documented as causing the following operating problems resulting from their different volatility and vaporization characteristics. First, because ethanol has a lower vapor pressure, it has been shown to cause starting problems because there is inadequate vapor pressure to a vapor mixture rich enough to ignite. In turn, such problems could result in consumer tampering of the engine's carburetor.

Second, because ethanol vaporizes at lower temperatures than gasoline, mid-level ethanol can cause "vapor lock." Vapor lock is a condition where the fuel in the engine's fuel delivery system vaporizes preventing the transport of liquid fuel to the carburetor or fuel injectors. Increasing the ethanol concentration beyond E10 is likely to increase the likelihood of vapor lock for open loop fuel control system engines typically used on older vehicles and most off-road engines. Even in the closed loop engine systems used in some off-road engines and in most late-model vehicles, there remains the likelihood of vapor lock.

Other concerns about low temperature fuel characteristics of ethanol blends include a) increased viscosity of ethanol/gasoline blends which may impede fuel flow and b) phase separation in the vehicle fuel system due to reduced water solubility.

⁶ (a) See EPA-420-D-06-004, Draft Regulatory Impact Analysis: Control of Hazardous Air Pollutants from Mobile Sources, Chapter 7, February 2006. (b) See also, Fuel Permeation from Automotive Systems: E0, E6, E10, E20, and E85, Final Report, CRC Project No. E-65-3, December 2006.

⁷ See, e.g., the CRC E-65-3 Project Report referenced earlier as well as the EPA document referenced earlier which also discusses testing conducted by the California Air Resources Board.

G. Summary of Impacts

The effects of increased ethanol in gasoline are generally not linear with the amount of oxygen in the fuel. Hence, the effects of increasing the ethanol content beyond E10 on current engines are not fully known. Table B presents an overview of all these effects and how they can influence emissions, performance, and durability, mainly for automobiles; but, in some instances, the effect of increased ethanol on less sophisticated off-road engines is also noted.

Table B
Properties of Ethanol And Associated Implications

<i>Property</i>	<i>Implication</i>
Hydrogen Bonding/Vapor Pressure	This makes pure ethanol have a very low vapor pressure compared to gasoline. But it also means the vapor pressure of a mixture can be higher than the gasoline alone. Where the peak vapor pressure occurs depends on the base gasoline vapor pressure and ethanol concentration. With a 9 RVP base gasoline, the peak occurs at around 6-7% by volume. ⁸ Vapor pressure directly affects the evaporation rate and potential hydrocarbon emissions.
Hydrogen Bonding/Water Attraction	Easy hydrogen bonding makes ethanol attract water. The presence of water, in turn, increases the risk that certain metals will corrode. This becomes a problem when fuel remains in storage (including vehicle fuel tanks) and handling systems for a long time.
Oxygen Atom	Ethanol's oxygen atom lowers its energy content, which reduces fuel economy. A blend's final energy content and the impact on fuel economy depends on the amount of ethanol and gasoline density. Most blends up to 10% ethanol by volume do not affect fuel economy to a significant extent (about 1-3%).
Oxygen Atom	Ethanol mixed with gasoline makes the air-to-fuel ratio leaner than with gasoline alone. Controlling the air-to-fuel ratio is critical to the combustion process and engine performance. Performance problems include hesitation, stumbling, vapor lock, and other impacts on drivability. Pre-ignition also can occur, causing engine knock and potential damage. Ambient temperature and pressure are important factors.
Oxygen Atom	Manufacturers calibrate the oxygen sensors (used in modern vehicle technologies but not in off-road equipment, in general) to recognize specific levels of oxygen in the exhaust stream. If a mixture is outside the calibration range, the sensor will send inaccurate signals to the air-to-fuel feedback and on-board diagnostic systems. This could cause improper air-to-fuel ratios as well as an increased risk of causing one of the dashboard's warning lights (MIL) to illuminate.
Higher Combustion Temperature	This increases the formation of NO _x , an ozone precursor, in the exhaust gas. Modern three-way catalysts in vehicles reduce NO _x by more than 99%, except before the catalyst fully warms up (i.e., during cold-start engine operation). Excessive combustion temperatures also can cause engine damage.
Higher Latent Heat of Vaporization	This can delay catalyst "light-off," which is period of time before the catalyst warms up and can reduce exhaust emissions of HC, CO, and NO _x .
Higher Electrical Conductivity	This property increases galvanic corrosion of metals.
Permeability	Ethanol readily permeates at significant rates through elastomers, plastics, and other materials used widely for hoses, o-rings, and other fuel system parts. Depending on temperature and the materials used in the fuel system, this can significantly increase

⁸

See API Publication 4261, June 2001

	hydrocarbon emissions.
Solvency	Under certain conditions, the presence of ethanol can cause certain detergency additives to precipitate out of solution, leaving the engine unprotected from gummy deposits. Deposits can increase emissions, lower fuel economy, and increase drivability problems.
Polarity or Oxygen Atom	Ethanol lowers fuel lubricity by binding to metal surfaces and displacing motor oil. This effect increases cylinder bore wear.
Solvency	Ethanol is an effective solvent that mixes readily with both polar and non-polar chemicals. This property allows ethanol to dissolve some adhesives used to make paint adhere to vehicle bodies. Ethanol also dissolves certain resins and causes them to leach out of the fiberglass fuel tanks used in some boats. Not only does this cause the tank to deteriorate, it also creates a sludge that coats the engine and can cause stalling and other performance problems. ⁹

⁹ See "Important News for Boat Owners," at www.ethanolrfa.org.

H. Ethanol-Compatible Design

It is instructive to review the types of changes that have been made in certain automobiles to handle greater than E10 fuels. Table C, below, shows the types of changes that have been made in Brazilian vehicles in order to accommodate higher ethanol blends.

Table C
Adaptation of Brazilian Vehicles¹⁰ for Use with E22 or E85+¹¹

System	Part Change
Air-Fuel Feed	Electronic fuel injectors: must use stainless steel and modify the design to improve fuel "spray" and throughput. Manufacturers calibrate the system to the fuel, to ensure the proper air-to-fuel ratio and an appropriate Lambda sensor working range.
	Carburetors: must treat or otherwise protect aluminum or zinc alloy surfaces.
Fuel Handling System	Fuel pumps: must protect internal surfaces and seal connectors; a different metal may be required.
	Fuel pressure regulators: must protect internal surfaces; internal diaphragm may need to be up-graded.
	Fuel filter: must protect internal surfaces and use an appropriate adhesive for the filter element.
	Fuel tank: if metallic, must protect (coat) the internal surface. If plastic, may need to line the interior to reduce permeation.
	Fuel lines and rails: may need to coat steel parts with nickel to prevent corrosion or replace with stainless steel.
	Fuel line quick connects: must replace plain steel with stainless steel.
Emission Controls	Hoses and seals: "o-ring" seals and hoses require resistant materials.
	Vapor control canister: may need to increase the size of the canister and recalibrate it for the expected purge air flow rate.
Powertrain	Catalyst: may need to adjust the kind and amount of catalyst and wash coating.
	Ignition System: must recalibrate ignition advance control.
	Engine: should use a higher compression ratio for proper operation; new camshaft profile and phase; and new materials for the intake and exhaust valves and valve seats.
	Intake manifold: must be able to deliver air at a higher temperature; requires a new profile and must have a smoother surface to increase air flow.
Other	Exhaust pipe: must protect (coat) the internal surfaces and ensure design can handle a higher amount of vapor.
	Fuel filler door paint: must change paint formula used on plastic fuel filler door to avoid loss of paint adhesion.
	Motor oil: may require reformulation and/or a new additive package.
	All parts that might be exposed to the fuel: avoid polyamide 6.6 (nylon), aluminum, and various zinc alloys. If these materials are used, their surfaces must be treated or otherwise

¹⁰ Brazil's vehicle emission standards are less stringent than those in the U.S., so U.S. vehicles may require additional effort and calibration to meet emission and durability standards.

¹¹ "Fuel Specifications in Latin America: Is Harmonization a Reality?" Henry Joseph Jr., ANFAVEA (Brazilian Vehicle Manufacturers Association), presented at the Hart World Fuels Conference, Rio de Janeiro, 21-23 June 2004.

	protected.
	Vehicle suspension: may need to modify to accommodate a higher vehicle weight
	Cold start system (for E85 or above): may require an auxiliary start system with its own temperature sensor, gasoline reservoir, extra fuel injector, and fuel pump; also, the vehicle battery must have a higher capacity.

For automobiles designed to handle greater than E10, the changes involve the use of innovative and ethanol-compatible technologies, material changes, and adjustments in calibration. In all cases, one cannot adapt or retrofit existing products because too many parts and design steps are involved and the product may have size constraints. Necessary modifications must occur during design and production to ensure compliance with strict emission standards and to meet consumer expectations for safety, durability, performance, and cost.

To ensure materials compatibility at higher ethanol levels for use with flexible fuel vehicles (FFVs), manufacturers use corrosion resistant materials in any part that may contact fuel. For example, Brazilian auto manufacturers, who have considerable experience producing ethanol-compatible vehicles, recommend using electronic fuel injectors made with stainless steel, larger holes, and modified designs to improve fuel spray. Significant changes to the fuel pump and fuel pump motor are also often needed. Similarly, manufacturers of carbureted engines—for example, almost all small engine products such as chain saws and lawn mowers, as well as older and antique vehicles—recommend, among other steps, coating or anodizing aluminum carburetors or substituting a different metal not susceptible to attack.

Boats have similar compatibility concerns. Many, for example, use aluminum fuel tanks that are susceptible to corrosion. While sacrificial zinc anodes often are added later to the external parts of these tanks, they are not feasible for the tank's interior.¹² Older yachts with fiberglass tanks have a different problem. Ethanol can chemically attack some of the resins used

¹² NMMA Ethanol Position Paper, no date, available at www.nmma.org/government/environmental/?catid=573.

to make these tanks causing them to dissolve. In doing so, the ethanol causes leaks, heavy black deposits on marine engine intake valves, and deformation of push rods, pistons, and valves.¹³

Conventional vehicles and products do not have these material adaptations for higher level ethanol use. One device particularly difficult to address after-the-fact is the fuel tank level sensor. These sensors, which are placed inside the fuel tank, directly expose wiring to the fuel. Depending on how much ethanol these devices contact and for how long, galvanic or electrolytic corrosion would be expected to dissolve the wires and eventually cause device failure.

Manufacturers make additional design changes to address emissions and performance needs.¹⁴ In this context, it is important to remember that U.S. emission standards are more stringent than those in Brazil. For U.S. vehicles, manufacturers select oxygen sensors and onboard diagnostic (OBD) systems specifically to cover the expected range of oxygen in the exhaust gas. If the fuel ethanol pushes the exhaust oxygen content outside the range of the oxygen sensor, the vehicle's OBD system won't work properly and may erroneously illuminate or fail to illuminate the dashboard warning light. In addition, manufacturers must calibrate vehicle and product systems to the expected fuel to ensure the proper air-fuel ratio for both emissions and performance purposes. In the U.S., off-road engines are also regulated for emissions regardless of their size or equipment that they power. Generally, the off-road engines do not utilize oxygen sensors and computer controls to adjust fuel delivery by a closed loop system. In many products, emission compliance has dictated air-to-fuel ratio controls that are a delicate balance between being too rich and, therefore, out of compliance, or too lean, resulting in performance or durability problems.

¹³ Id.

¹⁴ "Fuel Specifications in Latin America: Is Harmonization a Reality?" Henry Joseph Jr., ANFAVEA (Brazilian Vehicle Manufacturers Association), presented at the Hart World Fuels Conference, Rio de Janeiro, 21-23 June 2004.

The long term durability of emission control systems is a critical issue, with current U.S. federal and California emission standards requiring on-road vehicles to comply for up to 150,000 miles and off-road engines to comply for full useful life periods. If the control system of the vehicle was not designed to accommodate the leaning effect of ethanol, the vehicle's catalyst protection routine will be disabled. For off-highway engines, or older vehicles without closed loop systems, the enrichment influence can result in higher exhaust gas temperatures. This can cause thermal degradation of the catalyst over time, either through sintering of the precious metal wash-coat or damage to the substrate and can also degrade critical engine components such as pistons and exhaust valves.

**Preliminary Comments
on the report titled**

*“Effects of Intermediate Ethanol Blends on Legacy Vehicles and Small Non-Road Engines,
Report 1 – Updated,” NREL/TP-540-43543 and ORNL/TM-2008/117, dated February 2009*

Dr. Ron Sahu, Consultant to the Outdoor Power Equipment Institute (OPEI)

These comments focus exclusively on major adverse impacts observed during the tests performed on Small Non-Road Engines (SNRE), including lawn, garden and forestry products, like lawnmowers and trimmers.

**I. THE TESTS DOCUMENT THE FOLLOWING MAJOR ADVERSE IMPACTS
RESULTED FROM FUELS GREATER THAN 10% ETHANOL**

A. Engine exhaust temperatures rose significantly. Significant rises in temperatures (exhaust, cylinder head, etc.) occurred on the order of 20 to 70 C from engines run on E0 compared to E20. For several categories, significant temperature rises resulted between E10 and E15. Additional heat generation has obvious implications on increased burn and fire hazards – considering the proximity of cut grass, wood chips and the operator to the engine’s hot exhaust. However, the report does not delve into the implications of the additional heat and its ramifications on engine and equipment failure, personnel safety, increased fire hazards, or the inability to mitigate any of these hazards on millions of pieces of legacy equipment.

B. Risks to operators dramatically increased. The report recognizes that unintentional clutch engagement resulted on several tested products because of high idle speeds. Obviously significant risks are created when a chainsaw blade becomes engaged when the product should be idling. However, there is no discussion in the Report of this increased hazard. If anything, the mitigation proposed (i.e., adjustment of fuel air mixture enleanment) is

unworkable and may even be illegal “tampering” under the EPA regulations. It is certainly not feasible to adjust carburetors on millions of legacy equipment that are already in use.

C. Damage to Engines. Both of the tested “Residential Handheld Engines” (engines B-3 and B-7 as shown in Figure 3.9, pp. 3-18) suffered total and complete failures and would not start or operate after running on E-15 fuel for 25 or less hours, which is less than half of their useful life.

D. Operational Problems. Many of the engines tested on mid-level ethanol suffered from erratic equipment operation, “missing” and stalling of engines, and power-reduction.

II. MISCHARACTERIZATION OF RESULTS IN THE EXECUTIVE SUMMARY

The Executive Summary does not accurately summarize the scope, results as well as uncertainties associated with the testing. Since most of the policy-makers will focus only on the Executive Summary, this could result in misinformed policies based on misleading conclusions.

There appear to be numerous, material inconsistencies in the manner in which the results are reported in the main body of the report versus in the Executive Summary, including the following examples:

A. The Executive Summary merely notes three handheld trimmers experienced higher idle speeds and unintentional clutch engagement. (See Sec. E.5.2). The report recognizes that this same problem could also occur on chainsaws. (See Sec. 3.2). The implications of unintentional clutch engagement in chainsaws and hedgeclippers (which are both examples of

close-to-the-body, sharp-bladed equipment) are obvious and alarming; this substantial problem should have been fully addressed in the Executive Summary.

B. With regards to materials compatibility, the Executive Summary incorrectly concludes that "...no obvious materials compatibility issues were noted..." (see p. xix). In fact, the report itself recognizes that materials incompatibility (such as swelling of the elastomeric seat for the needle in the carburetor bowl) could be the cause of the engine stall for the Briggs and Stratton generator observed in the pilot study (see pp. 3-15). The report also states that: 1) "...various fuel-wetted materials in some small engines may not be compatible with all ethanol blends..." (see p. 3-9); and 2) "...materials compatibility issues...were not specifically characterized as part of the study..." (see p. 3-12).

C. Engines in the study experienced "unstable governor operation," "missing" and "stalling" when operating on E20 fuel, indicating unacceptable performance. (See Section 3.2.2). However, the Executive Summary omitted any discussion of these substantial problems.

D. Discussing emissions, the Executive Summary simply notes that HC emissions "generally decreased" and that combined HC+NOx emissions "decreased in most instances." (See p. xix). However, the report notes that while HC emissions generally decreased, they also increased in some engines. The net change in HC+NOx emissions ranged from -36% to +41% as reported in Sec. 3.2.2. It is important to note that for new engines, the net change in HC+NOx was often greatest in going from E0 to E10 and smaller in the other transitions (i.e., from E0 to E15 or E0 to E20). (See Table 3.7). For example, the numerical average for all engines shows that the HC+NOx reduction was -16.6% from E0 to E10; -13.5% from E0 to E15 and only -9.5% from E0 to E20. Since small engines are already capable of E10 operation and that fuel is

already available, this data indicates that transitioning to E15 and E20 may actually increase HC+NO_x from E10. (As a side note, what is actually measured as HC in the study is unclear since a FID was used for this purpose, uncorrected for any ethanol or aldehydes, as noted in the report).

III. DEFICIENCIES IN THE TESTING PLAN AND SCOPE

A. No emissions testing pertaining to evaporative emissions was conducted. Thus, all references to “emissions” means tail-pipe emissions from the engine. Evaporative emissions are now regulated by EPA for small engines and equipment and covered by the EPA “certification” program. Lack of evaporative emissions is a major omission.

B. The report does not contain any direct data on “materials compatibility” testing or results – i.e., involving the various fuels tested and the materials that may be exposed to these fuels and how they interact. Material compatibility is a significant concern with E15 and E20 fuels when used in small engines, leading not only to “operational issues” but also to durability, emissions, and safety impacts.

C. The report notes that the following fuels were used: E0, as well as splash-blended E10, E15, and E20. However, the report does not contain the actual ASTM specification of the blended fuels, including all relevant properties such as distillation cut point temperatures, etc. Table 2.2 of the report contains a few parameters of the blends. This is incomplete and a more complete fuel specification should be provided. The executive summary concludes that “...the different fuel characteristics of match-blended and splash-blended fuels were not expected to have a significant impact on temperature” or on durability. (See p. xviii). However, there is not any cited technical support for these statements. Similarly, there is no support for the

observation that "...emission results...are not expected to vary significantly...between splash-blended and match-blended fuels." *Id.*

D. As the report notes, neither cold-start, nor warm-up testing was done, although these are two very common modes of operation for many categories of small engines. Additional performance tests that impact "operational issues" which should have been tested include: (i) acceleration; (ii) application performance; (iii) carburetor and breather icing; (iv) fuel consumption; (v) governor stability; (vi) load pick up; and (vii) vapor lock. Individual categories of small engines will likely have additional performance-related test requirements.

E. As the Executive Summary notes, the report presents "initial results...focused on identifying emissions or operational issues and measurement of several key engine temperatures..." (See p. xviii). It is not clear what is meant by "operational issues" or what quantitative surrogates and/or metrics were used to substitute for operational issues. It appears that erratic operation, high idle, stalling, etc. were used as evidence of operational issues. While these are undeniably evidence of operational issues, no testing appears to have been done on various actual equipment operational modes (as discussed later) so the full extent of operational issues has by no means been evaluated.

F. The report does not fully flesh out the issue and implications of irreversibility – i.e., once exposed to E15 and/or E20, performance is not restored simply by reverting to E0. In the case of the Poulan weed eater, it is noted that there were poor operations with E15 and E20 and that "normal operation could not be restored on E0." (See Section 3.2.2). This is significant. Actual users, when faced with operational problems with ethanol blended fuels, will, as common

sense dictates, revert to E0. What they will find is that doing so will not “unring the bell” since the damage by the ethanol blends is not reversible simply by changing the fuel.

IV. UNREPRESENTATIVE AND LIMITED NUMBER OF TESTS CONDUCTED

A. The category of forestry, lawn and garden equipment includes a broad swath of equipment and engine types. Yet, the category has not been defined in the report so that the extent of test results presented can be judged in context. While noting that millions of products with small engines are sold each year (actually tens of millions), and that EPA certifies on the order of 900 engine emission families, the report does not cover the immense diversity of the category including: 1) the various engine and equipment types used, 2) the fuel delivery mechanisms, 3) the various sizes and functions of the equipment, 4) the constraints that the equipment operate under (such as close proximity to operators, as an example), and 5) many other characteristics. Engines in this product category utilize a wide variety of engine architecture including both single and twin cylinders, two cycle and four cycle combustion, ported and valve charge controlled, side valve and overhead valve orientations, with and without exhaust after-treatment, governed load and product load controlled, etc. The report should clearly qualify its findings are based on a tiny fraction of the diverse population of affected products.

B. The types and numbers of engines and equipment tested are inadequate to be representative of even the limited types of small engines that were the subject of testing. While practical constraints such as time and money will always constrain the amount of testing that can be done, the basis for choosing the engine and equipment – namely those found in “...popular, high sales volume equipment...” appears not to have been followed. For example, of the six pieces of equipment selected for the pilot study, four were generators. No chainsaws were

tested, even though the OPEI had directly requested that they be included – because of their extreme operating conditions and sensitivity to mid-level ethanol. Also, it is explicable why only one residential hand-held engine would be tested, even though these are likely to be very sensitive to fuel changes. The report should provide the basis of selection rather than referencing unspecified EPA sources. One of the constraints also seems to have been the available laboratory equipment (i.e., lack of small engine dynamometers). This is clearly an inappropriate basis for constraining equipment selection, especially if the goal is to obtain data on the entire class of affected engines and products.

C. The report rightly notes the challenges associated with multi-cylinder engines – although characterizing these as being “more sensitive” is too vague. (See p. 3-11). It is unfortunate that while the study included one twin cylinder engine in the initial screening process, there were no twin cylinder engines included in the more in depth portions of the testing program. Particularly when the initial screening test clearly demonstrated significant influences of higher ethanol blends. A significant portion of the Class 2 (>225 cc) non-handheld engines produced each year are two cylinder engines. The omission of these engines in the expanded program is puzzling. The detailed test program should include engines and equipment that demonstrated any significant influence during the screening tests.

D. The limited number of tests conducted cannot provide assurances that the results presented have any statistical significance, where appropriate. In fact, no attempt is made to discuss results in terms of statistical significance. Nor are such issues discussed in support of the design of the test matrix itself. For example, no pair-wise tests were run or results reported even though those opportunities were available even with the limited equipment selection.

E. The manner in which the tests were run makes it difficult to separate the effects of engines, fuels, and aging. For example, the full-life tests do not allow the ability to distinguish between fuel-driven and engine-driven causes since only one engine was tested on each fuel. In the pilot study, the effects of the fuel and aging are similarly hard to separate. These types of issues could have been avoided with better test planning.

V. OTHER COMMENTS

A. The comments are preliminary because not all of the test data discussed in the report are included. Specifically, backup test data for all tests conducted by the Dept. of Energy (NREL and ORNL) and its contractors (TRC) still need to be provided.

B. The report notes that the test plan was developed with close consultation involving, among others, "...US automobile companies, engine companies, and other organizations..." It would be helpful to have details of all the companies and individuals consulted in an Appendix to the report.

C. The report does not separately discuss the comments of the peer reviewer(s) and what changes were made to the draft report as a result. While the Acknowledgements note that the peer review panel was led by Joseph Colucci, the report does not contain a list of all peer reviewers used, what portions of the report were peer reviewed by whom, and the necessary vitae for the reviewers. This should be included.

Biographical Sketch**RANAJIT (RON) SAHU, Ph.D.,****CONSULTANT, ENVIRONMENTAL AND ENERGY ISSUES****311 North Story Place****Alhambra, CA 91801****Phone: 626-382-0001****e-mail (preferred): sahuron@earthlink.net****EXPERIENCE SUMMARY**

Dr. Sahu has a Bachelors of Technology (Mechanical Engineering) degree from the Indian Institute of Technology (IIT, Kharagpur) as well as a M.S/Ph.D in Mechanical Engineering (Combustion) from the California Institute of Technology (Caltech).

Dr. Sahu has over sixteen years of experience in the fields of energy, environmental, mechanical, and chemical engineering including: program and project management services; design and specification of air pollution control equipment; soils and groundwater remediation; combustion engineering evaluations; energy studies; multimedia environmental regulatory compliance (involving statutes and regulations such as the federal CAA and its Amendments, Clean Water Act, TSCA, RCRA, CERCLA, SARA, OSHA, NEPA as well as various related state statutes); transportation air quality impact analysis; multimedia compliance audits; multimedia permitting (including air quality NSR/PSD permitting, Title V permitting, NPDES permitting for industrial and storm water discharges, RCRA permitting, etc.); multimedia/multi-pathway human health risk assessments for toxics; air dispersion modeling; and regulatory strategy development and support including negotiation of consent agreements and orders.

He has over fifteen years of project management experience and has successfully managed and executed numerous projects in this time period. This includes basic studies and applied research projects, design projects, regulatory compliance projects, permitting projects, energy studies, risk assessment projects, and projects involving the communication of environmental data and information to the public.

He has provided consulting services to numerous private sector, public sector, and public interest group clients. His major clients over the past sixteen years include the Outdoor Power Equipment Institute and its various members who are manufacturers of small engines and equipment, various steel mills, petroleum refineries, cement companies, aerospace companies, power generation facilities, spa manufacturers, chemical distribution facilities, and various entities in the public sector including the EPA, U.S. Dept. of Justice, California DTSC, and various municipalities. Dr. Sahu has performed projects in over 48 states, numerous local jurisdictions, and internationally.

In addition to consulting, Dr. Sahu has taught and continues to teach numerous courses in several southern California universities including UCLA, UC Riverside, and Loyola Marymount University for the past fourteen years. In this time period, he has also taught at Caltech and USC.

Dr. Sahu has and continues to provide expert witness services in a number of environmental areas discussed above in both state and federal courts as well as before administrative bodies.

American Motorcyclist Association
 Association of Global Automakers
 Association of Marina Industries
 BoatUS
 International Snowmobile Manufacturers Association
 Motorcycle Industry Council
 National Boating Federation
 National Marine Manufacturers Association
 Outdoor Power Equipment Institute
 Personal Watercraft Industry Association
 Recreational Off-Highway Vehicle Association
 Specialty Vehicle Institute of America

March 23, 2011

The Honorable Lisa P. Jackson
 Administrator
 United States Environmental Protection Agency
 Ariel Rios Building
 1200 Pennsylvania Avenue, NW Mail Code 1101A
 Washington, D.C. 20460

Re: Petition for Rulemaking Under the Clean Air Act to Require the Continued Availability of Gasoline Blends of Less Than or Equal to 10% Ethanol

Dear Administrator Jackson,

Pursuant to the Administrative Procedure Act (“APA”) and the Clean Air Act (“CAA”), manufacturers of motor-vehicles, boats, marine engines, motorcycles, and lawn and garden equipment, as well as organizations that represent the consumers that own and operate these products, hereby petition the Administrator of the United States Environmental Protection Agency (“EPA”) to promulgate a regulation requiring gasoline retailers to continue to make available gasoline blends of no greater than 10% ethanol (“≤E-10 fuel”). This affirmative marketing requirement is necessary to ensure that there will be no damage to (or impairment of) the emissions-related components on nonroad products and older model year motor vehicles – which were explicitly excluded from EPA’s “partial waivers” allowing the conditional use of blends up to fifteen percent ethanol (“E-15”) exclusively in newer model year motor vehicles.¹ EPA limited the scope of these waiver decisions because of the well-documented, emission-related problems that misfueling with E-15 could cause to at least all nonroad products and older

¹ 75 Fed. Reg. 60894 (Nov. 4, 2010); 76 Fed. Reg. 4662 (Jan. 26, 2011)

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model year motor vehicles. EPA has clear authority to adopt such affirmative fuel marketing requirements under Section 211(c) of the Clean Air Act.

I. There Will be a 100% Misfueling Rate of Nonroad Products and Older Model Year Motor Vehicles at Gasoline Stations that Only Offer E-15

EPA has issued two partial waivers allowing the use of E-15 in 2007 and newer model year vehicles and 2001-2006 model year vehicles, respectively. However, EPA denied a waiver for several other categories of vehicles and equipment, including: nonroad engines, vehicles, boats, and equipment; 2000 and earlier model year motor vehicles; motorcycles; and heavy duty gasoline vehicles.² EPA denied a waiver for nonroad engines, vehicles, and equipment on the basis that “there are emission related concerns with the use of E-15 in nonroad products, particularly regarding long-term exhaust and evaporative emission (durability) impacts and materials compatibility issues.”³ EPA made nearly identical statements with regard to model year 2000 and older motor vehicles and stated that such concerns also applied to heavy duty gasoline vehicles and engines and highway and off-highway motorcycles.⁴

The waivers covering 2001 and newer on-road motor vehicles included conditions requiring, among other things, mitigation of the potential for misfueling. In addition, EPA proposed a separate misfueling regulation that would supersede the misfueling waiver conditions when promulgated. There, EPA recognized its concerns with misfueling E-15 into nonroad products “include not only the potential for increased exhaust and evaporative emissions but also the potential for engine failures from overheating.”⁵ However, despite EPA’s admission of the potential adverse environmental and economic consequences of misfueling, EPA’s misfueling proposal will not adequately ensure the continued protection of emissions control devices and air quality because it does nothing to ensure that the appropriate fuel is available for purchase for vehicles and equipment not subject to the waivers. Thus, if ≤E-10 fuels are not available (alongside grades up to E-15 at all gasoline stations choosing to provide fuels greater than E-10), consumers will have no choice but to misfuel with E-15.

² Note that nonroad products means those nonroad products that contain spark-ignition engines and are used to power nonroad vehicles and equipment such as boats (including outboard marine engines, and Sterndrive Inboard Engines (SD/I)), Personal Watercraft (PWC), snowmobiles, generators, lawnmowers, forklifts, ATVs, nonroad motorcycles, lawnmowers, trimmers, chainsaws, and many similar products. See 75 Fed. Reg. at 68129-37.

³ 75 Fed. Reg. at 68137

⁴ *Id.* at 68129, 68138

⁵ 75 Fed. Reg. 68044, 68046 (November 4, 2010)

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Concerns over the availability of \leq E-10 fuel will increase as pre-2000 MY vehicles are replaced, as fuel use for the remaining categories of vehicles and equipment (not subject to a waiver) will constitute a small and declining percentage of the total fuel delivered by any fueling station. This concern is particularly acute given the stringent phase-in of the RFS program. The incentive for fueling stations to maintain a separate tank and pump for vehicles and equipment not subject to a waiver is minimal and would result in higher unit fuel costs to provide sufficient operating margin for the station to offer \leq E-10 fuel. Indeed, many stations may not even have enough tanks to accommodate an additional fuel, leading them to choose between E-15 and \leq E-10 fuels or to install additional tanks for \leq E-10 fuels and pass on those prices to consumers.⁶ These additional costs would provide an additional disincentive for consumers to locate and utilize \leq E-10 fuel. If a retailer opts not to undergo these additional costs, it is reasonable for EPA to presume that a facility will elect to market only E-15, as E-15 is expected to be the cheaper fuel in the marketplace and gasoline retailing is highly price-sensitive.

There is also a strong potential that the reduced volume of \leq E-10 fuel required in the marketplace would result in elimination of supply, further eroding the availability of \leq E-10 fuel. This potential is heightened by the fact that the base fuel utilized for an E-15 blend would not be a legally viable fuel for blending and distribution with lower ethanol concentrations required for nonroad engines and equipment unless EPA also eliminates the 1% RVP waiver for current E-10 fuels as well.

II. EPA Has the Legal Authority to Ensure the Continued Availability of \leq E-10 Fuel

Petitioners urge EPA to adopt additional affirmative marketing requirements to mitigate misfueling to the greatest extent practicable. Under Section 211(c) of the CAA, the Administrator may promulgate controls, including affirmative fuel marketing requirements, "if emission products of such fuel or fuel additive will impair to a significant degree the performance of any emission control device or system which is in general use..."⁷ In addition, EPA also enjoys statutory authority to promulgate affirmative marketing requirements under another provision of Section 211(c), which permits the Administrator to control or prohibit fuels "if the emission product of such fuel or fuel additive causes or contributes to air pollution which may reasonably be anticipated to endanger public health or welfare."⁸ In its proposed ethanol misfueling control regulations, EPA has already proposed to make the requisite findings related

⁶ See Flexible-Fuel Vehicle and Refueling Infrastructure Requirements Associated with Renewable Fuel Standard (RFS2) Implementation, Conducted for the Renewable Fuels Association (March 2011), available at http://ethanolrfa.3cdn.net/dc3fb2d776734043df_13m6iivny.pdf

⁷ See CAA Section 211(c)(1)(B)

⁸ See CAA Section 211(c)(1)(A)

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to “health and welfare” and “significant impairment” under both provisions of 211(c)(1) that would support an affirmative marketing requirement. Specifically, EPA concluded that:

Under Section 211(c)(1)(B), we believe that E15 would significantly impair the emission control systems used in MY2000 and older light-duty motor vehicles, heavyduty gasoline engines and vehicles, highway and off-highway motorcycles and all nonroad products... [and] that the likely result would be increased HC, CO, and NOx emissions when these particular engines, vehicles, and nonroad products use E15.⁹

Comments submitted into the dockets on the EPA E-15 partial waiver and the related proposed misfueling controls already include a large volume of specific information submitted by Petitioners that meets both of these statutory prongs. For example, attached please find comments submitted by the AllSAFE coalition, (which includes several of the Petitioners) in the E-15 partial waiver docket.¹⁰ These enclosed comments (as well as the other related comments submitted by the Petitioners) demonstrate that misfueling with E-15 will cause a “substantial impairment of emission control devices” and will “degrade air quality” and thus endanger public health or welfare.

III. Regulatory and Judicial Precedent Supports EPA’s Adopting the Requested Affirmative Marketing Requirements

Because EPA cannot predict with certainty that ≤E-10 fuel will be available for the legacy fleet, Petitioners request that EPA, consistent with prior precedent, promulgate an affirmative marketing requirement that ensures continued consumer choice and effectuates its E-15 waiver conditions and labeling requirements. EPA cannot reasonably rely on the assumption that market forces will ensure the continued availability of ≤E-10 fuel when it has approved a waiver based on conditions relating to misfueling. Rather, it must create legal obligations that ensure that the conditions on which the waivers were based will be fulfilled, and it must do so proactively before emission control devices, air quality, and public health are negatively impacted.

EPA has in the past appropriately used its CAA Section 211(c) authority to “control or prohibit” the sale or offering for sale of fuels to ensure the protection of emission control devices. Specifically, during the transition to unleaded fuels in the 1970s, EPA invoked its Section 211(c) authority to ensure that unleaded fuel was available to consumers in order to prevent the impairment of emission control devices. EPA’s prior experience with fuel transitions and misfueling demonstrates that labeling alone is insufficient to prevent misfueling. EPA’s

⁹ 75 Fed. Reg. 68044, 68081 (Nov. 4, 2010)

¹⁰ See Exhibits A and A-1 (Docket # EPA-HQ-OAR-2009-0211-2559.1)

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original unleaded fuel controls in 1974 included three essential components: (1) a warning label; (2) robust misfueling controls (i.e. restricted fuel nozzle diameters); and (3) *the required availability of unleaded fuels at a threshold number of gasoline stations*.¹¹

In developing the misfueling control regulations for unleaded fuels, EPA correctly determined that “without regulatory action requiring retail outlets to market at least one grade of such gasoline, availability of that product to the general public in all areas of the country would be uncertain, and may not be sufficient to ensure the protection of catalytic control devices.”¹² In a series of rulemakings, EPA ultimately required that all urban gasoline retailers that sold more than 200,000 gallons per year and all rural gasoline stations that sold more than 150,000 gallons in any year after 1971 provide at least one pump for unleaded gasoline.¹³ EPA maintained these affirmative marketing obligations throughout the phaseout of lead gasoline until it ultimately determined that availability of unleaded gasoline was so widespread as to make the requirements unnecessary.¹⁴ Notably, when EPA ultimately eliminated the affirmative marketing requirement, it justified it on the basis that it was no longer necessary because more than 90% of purchased fuel was unleaded gasoline, thus creating a readily available commercial market for unleaded gasoline.

The D.C. Circuit upheld the affirmative marketing requirement, holding that the “the term ‘control’ encompasses the power to promote the availability of fuels needed for proper operation of emission control devices.”¹⁵ The court reasoned that if unleaded gasoline were not conveniently available then the statutory intent of the Clean Air Act would be undermined because mandated emission controls would be damaged, resulting in the impairment of emission control devices.¹⁶ The *Amoco* court further noted that given the enormous “stakes” of damage to emission controls through misfueling, EPA “need not gamble” that the free market would supply sufficient quantities of unleaded gasoline.¹⁷

¹¹ See Exhibit B, Controls applicable to gasoline retailers and wholesale purchaser-consumers, 40 C.F.R. § 80.22 (1975)

¹² 38 Fed. Reg. 1254 (January 10, 1973)

¹³ 37 Fed. Reg. 3882 (February 23, 1972); 38 Fed. Reg. 1254 (January 10, 1973); 38 Fed. Reg. 28301 (October 12, 1973); 39 Fed. Reg. 16123 (May 7, 1974); 39 Fed. Reg. 43281 (December 12, 1974)

¹⁴ 56 Fed. Reg. 13767 (April 4, 1991)

¹⁵ See *Amoco v. EPA*, 501 F.2d 722, 744 (D.C. Cir. 1974)

¹⁶ *Id.*

¹⁷ *Id.* at 747

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EPA similarly need not gamble that \leq E-10 fuel will continue to be provided by market forces. Just as E-0 has rapidly been eliminated from the market in the face of RFS mandates and blending economics, there is a discernable threat that \leq E-10 fuel will soon become similarly scarce. Because nonroad products and older model year motor vehicles constitute only a fraction of total fuel use, these products would not provide economic justification for the marketing of \leq E-10 fuel. Rulemakings such as the one requested by petitioners require substantial lead time, and EPA must act proactively now to prevent potential problems. If EPA waits until \leq E-10 fuels become scarce in the market, it will be too late to commence a rulemaking to mitigate the misfueling that will surely result. Accordingly, Petitioners urge EPA to expeditiously promulgate an affirmative marketing requirement for \leq E-10 fuels.

IV. Conclusion

Based on the foregoing, Petitioners respectfully request that EPA promulgate an affirmative marketing requirement pursuant to CAA Section 211(c) that guarantees the availability of \leq E-10 fuel at any retail gasoline station that offers $>$ E10 fuels.

* * *

We look forward to working with EPA on the development and expeditious promulgation of this requested rulemaking. Please contact Kris Kiser at OPEI at (703) 549-7601 or Bill Guerry at (202) 342-8858 with any questions or requests for additional information.

Respectfully Submitted,

American Motorcyclist Association	National Boating Federation
Association of Global Automakers	National Marine Manufacturers Association
Association of Marina Industries	Outdoor Power Equipment Institute
BoatUS	Personal Watercraft Industry Association
International Snowmobile Manufacturers Association	Recreational Off-Highway Vehicle Association
Motorcycle Industry Council	Specialty Vehicle Institute of America

cc: Gina McCarthy
 Margo Oge
 Karl Simon



April 12, 2011

The Honorable Barbara Boxer
Chairwoman
Environment and Public Works Committee
U.S. Senate
410 Dirksen Senate Office Building
Washington, DC 20510

The Honorable James Inhofe
Ranking Republican
Environment and Public Works Committee
U.S. Senate
410 Dirksen Senate Office Building
Washington, DC 20510

Dear Chairwoman Boxer and Senator Inhofe:

Thank you for scheduling Wednesday's hearing on Domestic Renewable Fuels. On behalf of the National Sorghum Producers, I respectfully offer this letter for the hearing record.

As the Committee looks to revisit the issue of domestic renewable fuels, it is worth noting the context in which this hearing will take place.

Today's national average gasoline price continues its upward trend, toward \$4.00. Oil prices are nearing \$110 per barrel. Meanwhile, U.S. dependence on foreign oil is approaching 70 percent in the midst of ever increasing political instability in traditional oil source regions around the world. Beyond mobile fuel sources, America's other energy supply problems also appear serious and imminent.

Yet, despite this backdrop, U.S. energy policy cannot seem to fully or consistently embrace for very long any energy source, whether it is coal, nuclear, natural gas, oil, wind, biofuels, or any other. It seems objections arise from some quarter relative to each that ultimately influence public policy, making efforts to meet U.S. demand with domestic energy supplies an ever more elusive goal.

The mixed signals sent by Washington each time it rolls out and then rescinds or otherwise alters an energy policy edict, including any corresponding incentives to produce, affect all energy sources that, in some form or fashion, are each incentivized by U.S. energy policy, whether through the tax code, regulatory policy, or transfer payments. This pattern of equivocation chills both innovation and investment.

We believe that this energy policy rut that we find ourselves in today plus the current energy price environment strongly caution against lawmakers taking any action that could have the

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effect of disrupting at least 10% of the nation's fuel supply and undermining the investment and infrastructure that support it.

As to the major objections to U.S. domestic renewable fuels, impartial economists have concluded that any nexus between renewable fuels usage and consumer food costs is minimal, that renewable fuels reduce consumer costs at the pump, and that a recent drop in major crop production is primarily responsible for the increased commodity price. These economists further indicate that inventories of major commodities used for renewable fuels are not expected to drop further this year, and that planting intentions for the upcoming crop year point to moderating crop prices. As such, we believe predicating any long term approach toward domestic renewable fuels based on short term conditions for major crops would be precipitous and would only deepen the energy policy rut we have dug ourselves into.

As domestic renewable fuels relate specifically to sorghum, we believe we have an especially positive story to tell.

As many members of this panel who hail from states such as Arkansas, Nebraska, Louisiana, Oklahoma, and New Mexico may already know, sorghum is an exceptionally environmentally friendly crop, known for its low water and input usage and its small carbon footprint, both with or without regard to indirect land use considerations. Members of this Committee from Oklahoma, Nebraska, and New Mexico represent three of the seven largest grain sorghum producing states, alongside Texas and Kansas, and have undoubtedly witnessed first-hand the production of this highly drought-resistant crop.

But, what may be less apparent to even those who have grown up around sorghum production is the extent to which its production is used as a feedstock for renewable fuels. Today, such use stands at about 37 percent of the sorghum crop. As just a few close-to-home examples, much of the sorghum produced in the panhandle of Oklahoma is destined for ethanol plants in Kansas, west Texas, and eastern New Mexico. As one might imagine, altering policies that would, in turn, adversely affect 37 percent of a crop's market would have consequences.

Less apparent still is the positive contribution that this usage has had on feed supplies since the DDGs produced as a co-product from sorghum's use in renewable fuels are, in many cases, preferred to the feedstock itself. In this regard, grain sorghum's participation in renewable fuels has actually increased feed supplies.

In addition to these positives for sorghum, generally, other sorghum varieties — known as sweet sorghum or energy sorghums — show great and current potential for ethanol

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production. While high biomass energy sorghums have proven effective in producing next-generation cellulosic ethanol, sweet sorghum ethanol is already a reality. Indeed, as we write this letter, an ethanol plant in Florida that will use sweet sorghum as its sole feedstock is planning its groundbreaking ceremony. This up-and-coming ethanol feedstock relies on time tested technology used in the sugar-to-ethanol industry, but utilizes domestic feedstock that can thrive across large swaths of the southern United States. Private industry has invested heavily in the seed and infrastructure components of this new ethanol production process, and an established sorghum industry stands ready to meet the need for plentiful feedstock. The concern is, does U.S. energy policy?

One consideration that I have not yet touched upon is the value of domestic renewable fuels to the economy and jobs. There is a stubborn tendency to downplay the significant role rural America and agricultural production, including domestic renewable fuels, play in the U.S. economy and its recovery. The Federal Reserve has written extensively on this point, which was similarly stressed in the pages of the Wall Street Journal and other publications during the manufacturing crisis of a decade ago. Given how fragile our nation's economic condition remains, it is our hope that Members of this panel will give proper weight to this consideration.

Finally, with respect to deficit reduction as a possible motive to alter the current policy toward domestic renewable fuels, we would hope that incentives for all energy sources would participate in this important exercise, just as we would hope that all policies of government, generally, would make a contribution and do so in a manner that is commensurate with their respective impacts on the overall federal budget.

Thank you for the opportunity to provide some additional, and we believe important, perspectives from the nation's sorghum producers on the subject of domestic renewable fuels.

Sincerely,

A handwritten signature in cursive script, reading "Gerald Simonsen". The signature is written in dark ink and includes a long, sweeping horizontal line extending to the right.

Gerald Simonsen
Chairman
Board of Directors



ENVIRONMENTAL WORKING GROUP

www.ewg.org

Written Testimony of

Craig Cox
Senior Vice President for Agriculture and Natural Resources,
Environmental Working Group

to the

United States Senate
Committee on Environment and Public Works
"Oversight Hearing on Domestic Renewable Fuels: From Ethanol to Advanced Biofuels"

Wednesday, April 13, 2011

Madam Chair, Ranking Member Inhofe and distinguished members of the committee: My name is Craig Cox. I am Senior Vice President for Agriculture and Natural Resources at the Environmental Working Group (EWG), a nonprofit research and advocacy organization based in Washington, DC, with offices in Ames, Iowa, and Oakland, Calif. I thank the members of the committee for holding this important hearing and for the opportunity to submit written testimony.

For almost two decades, our organization has been advocating for:

- (1) protecting the most vulnerable segments of the population from toxic contaminants, and
- (2) replacing federal policies, including subsidies that damage the environment and natural resources, with better policies that invest in conservation and sustainable development.

Because of the lack of enforceable environmental safeguards surrounding biofuels policy, we opposed expansion of the Renewable Fuels Standard (RFS) in the Energy Independence and Security Act of 2007.

For more than 30 years, corn ethanol has benefited from billions of dollars in taxpayer-funded subsidies paid directly to ethanol plants and to oil companies that blend it with gasoline. Despite this support, ethanol use has barely dented the nation's dependence on fossil fuels. With corn ethanol nearing the RFS production mandate of 15 billion gallons a year, we have learned painful lessons:

- Increased corn ethanol production to meet the RFS has resulted in severe unintended consequences.
- Millions of acres of sensitive land are being converted to monoculture corn production.
- Wildlife habitat and stream buffers are being destroyed.
- Water quality is being jeopardized by greater use of fertilizers and pesticides.
- Greenhouse gas emissions and costs to consumers are rising because of ethanol blends' lower gas mileage.

As Congress considers expansion of advanced biofuels, we must not repeat the mistakes that we made with corn ethanol.

I urge the Committee to consider biofuels' impact on food insecurity, land use changes and removal of agricultural residues for cellulosic ethanol, as well as the issues surrounding the use of 15 percent

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ethanol (E15) blends as fuel.

Impacts on Food Prices

Although EWG's work is mostly focused on domestic issues, we urge the Committee to examine the effects of our nation's biofuels policies on hungry and poor people in the United States and around the world. We are currently committing 40 percent of our nation's corn crop to ethanol production, contributing to higher commodity prices, and, in turn, food prices. As the demand for corn to fuel vehicles has grown, farmers seeking maximum corn production have stopped annual rotation of corn and soybeans and sown corn on land historically used to produce other crops. One result is that soil erosion problems have worsened and are now much worse than the government is reporting.¹

Corn stocks are nearly at all-time lows, corn prices are only a few cents from all-time highs, farm income is at a record level and the United Nations Food and Agriculture Organization's (FAO) monthly food price index is above the record levels of the 2008 food crisis. Today's higher food prices are the result of increased biofuels production combined with high oil prices, rising global demand for protein, adverse weather events and other factors. The bottom line, however, is that demand for corn is outpacing the supply. The U.S. Department of Agriculture (USDA) has estimated that domestic food prices will increase 4-to-5 percent this year, a trend that will cause disproportionate suffering for lower-income households and poor, hungry people in developing countries, who not only earn less but also spend a larger proportion of their income on food.²

Land Use Changes

Despite the \$6 billion of taxpayer dollars spent annually on ethanol subsidies, the use of a major food and feed crop for fuel has barely reduced oil imports and has polluted our environment. Advocates of the advanced biofuels industry point out that when so-called "second generation" biofuels are commercialized, food and feed crops will no longer compete with biofuel feedstocks. They also claim that the environment will benefit from advanced biofuels production.

However, EWG remains skeptical of cellulosic ethanol and advanced biofuels' potential. If cellulosic biofuel feedstocks continue to require large swaths of productive acres for bioenergy production, food prices will still be affected. The nation has a finite supply of productive land, the amount of "idle" or "marginal" land available for cultivation is uncertain, and to date there has been no commercially viable production of advanced biofuels. If cellulosic feedstocks are grown on land currently under the Conservation Reserve Program (CRP), wildlife habitat, air, water and soil will be degraded. All of these factors need to be taken into consideration before new facilities are built and additional land is converted into bioenergy feedstock production.

Removal of Agricultural Residues for Cellulosic Ethanol

Contrary to the corn ethanol industry's claims, a recent Environmental Protection Agency (EPA) draft

¹ Cox, Craig, Andrew Hug and Nils Bruzelius. "Losing Ground." April 2011. Accessed online 18 April 2011 at http://static.ewg.org/reports/2010/losingground/pdf/losingground_report.pdf.

² ActionAid USA and Environmental Working Group. "Hotspots in the Emerging Global Food Crisis." March 2011. Accessed online 18 April 2011 at <http://www.ewg.org/hot-spots-emerging-global-food-crisis>.

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report to Congress concluded that corn ethanol production is more likely to harm the environment than enhance it.³ The report also concluded that producing cellulosic ethanol from corn stover, an agricultural residue of stalks, leaves and cobs left on fields after harvest, would have similar consequences.⁴

Specifically, the EPA draft report indicated that USDA subsidies for the removal of corn stover for ethanol production will increase soil erosion, polluted runoff and greenhouse gas emissions and also lower soil moisture. Research has shown that removing as little as 25 percent of crop residues from certain sensitive soil and land types affects the stability of aggregates in silt loam and clay soils, soil temperature, nutrient cycling and water content.⁵ In a 2010 study, Humberto Blanco-Canqui of the Western Kansas Agricultural Research Centers found that “the extent of impacts depends on soil-specific characteristics (e.g., texture and drainage), topography, tillage system, crop grown, management duration and climate zones.”⁶

Removal of too much biomass from cropland can reduce the amount of plant nutrients available and diminish soil fertility. It can also lead to increased nutrient runoff, because biomass residues on the ground trap fertilizers and pesticides and prevent toxins from leaching into groundwater and streams.⁷ Soil erosion is already severe in portions of the Corn Belt and elsewhere.⁸ These problems will only worsen if the gains from decades-old conservation practices such as no-till or conservation tillage are suddenly reversed by the loss of nutrients from residue. Biofuels policies should enhance conservation practices and not indirectly or directly subsidize biomass removal at the expense of the environment.

Farmers are required to comply with these conservation practices to remain eligible for federal farm subsidy payments. No-till and conservation tillage have produced some environmental benefits, but challenges still exist. If too much stover or other biomass is removed, these benefits disappear. Unfortunately, these provisions and other farm bill regulations that prevent farmers from converting wetlands and native grassland into intensively managed cropland are not always monitored or enforced properly. Before new biofuels facilities are built or feedstocks are grown, we need to ensure that the

³ Environmental Protection Agency (EPA). “Biofuels and the Environment: The First Triennial Report to Congress.” 28 January 2011. Draft report. Accessed 18 April 2011 at <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=217443>.

⁴ Ibid.

⁵ Lal, R., J.M. Kimble, R.F. Follett, and C.V. Cole. 1998. “The Potential of U.S. Cropland to Sequester Carbon and Mitigate the Greenhouse Effect.” Ann Arbor Press, Chelsea, MI.
Unger, P.W. 1978. “Straw-mulch Rate Effect on Soil Water Storage and Sorghum Yield.” Soil Science Society of America Journal 42: 486–491.

⁶ Blanco-Canqui, Humberto. 2010. “Energy Crops and Their Implications on Soil and Environment.” Agronomy Journal 102.2. Accessed online 17 February 2011 at <http://www.wearemichigan.com/JobsAndEnergy/documents/EnergyCropsEnvironment.pdf>

⁷ Wilhelm, W.W., J.W. Doran, and J.F. Power. 1986. “Corn and Soybean Yield Response to Crop Residue Management Under No-tillage Production Systems. Agronomy Journal 78: 184–189.

Fixen, P.E. 2007. “Potential Biofuels Influence on Nutrient Use and Removal in the U.S.” Int. Plant Nutrition Inst. 91: 12–14.

Hoskinson, R.L., D.L. Karlen, S.J. Birrell, C.W. Radtke, and W.W. Wilhelm. 2007. “Engineering, Nutrient Removal, and Feedstock Conversion Evaluations of Four Corn Stover Harvest Scenarios.” Biomass Bioenergy 31: 126–136.

⁸ Cox, Craig, Andrew Hug and Nils Bruzelius. “Losing Ground.” April 2011. Accessed online 18 April 2011 at http://static.ewg.org/reports/2010/losingground/pdf/losingground_report.pdf.

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environment would benefit from their production, not vice versa.

The EPA draft report cited an estimate in the RFS2 Regulatory Impact Assessment (RIA) that 7.8 billion gallons of ethanol could be produced annually from corn stover by 2022. According to EWG's calculations and industry estimates, however, one would have to strip more than half of all corn stover from about 55 percent of all U.S. corn acres to produce that much ethanol. This analysis and other reports like the joint Billion-Ton Study by USDA and the Department of Energy (DOE) make clear that harvesting large amounts of corn stover will undermine efforts to mitigate irreversible environmental impacts. To accomplish both goals will require both stringent environmental standards and proper monitoring of their implementation. Current laws and regulations do not assure that corn stover will be removed in a sustainable manner.

Issues with E15

EPA recently granted a waiver for the use of 15 percent ethanol (E15) in vehicles manufactured in 2001 or later. EWG is deeply concerned about the effects of misfueling on consumer safety, public health and the environment. E15 fuel is incompatible with current gasoline storage and pipeline infrastructure, and various studies, including EPA's own analyses, have demonstrated that E15 will:

- (1) contribute to higher nitrous oxide, formaldehyde and acetaldehyde emissions;
- (2) cause corrosion of vehicle components and service station pump parts;
- (3) damage small engines and older motor vehicles, resulting in potential engine failure and other serious consequences.⁹

Furthermore, producing and using higher blends of E15 will reduce gas mileage and increase emissions of volatile organic chemicals.¹⁰

EWG also has grave concerns about the storage of ethanol in underground storage tanks because of its incompatibility with current materials in pipes, gaskets, seals, etc. EPA's recent draft report on biofuels rightfully recognized scientific estimates of the increased probability of fires, explosions and spills due to ethanol's corrosive and acidic properties. EPA has limited the use of E15 because of known problems with small engines and older vehicles, but the odds are low of preventing all misfueling. The decision to approve the E15 waiver was inconsistent with the research, and the likelihood of harm will only grow over time. Failure to definitively solve these problems will lead to a greater risk of health and safety issues, contamination of drinking water and increased pollution of air and soil.

Recommendations

It is essential that we apply the lessons learned from the history of corn ethanol to future biofuels policies. EWG recommends that Congress do the following:

⁹ Regulation to Mitigate the Misfueling of Vehicles and Engines With Gasoline Containing Greater Than Ten Volume Percent Ethanol and Modifications to the Reformulated and Conventional Gasoline Programs; Proposed Rule. Federal Register Notice - 40 CFR Part 80. 4 November 2010. Environmental Protection Agency. Accessed online 15 December 2010 at <http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480b80c65>

¹⁰ Naidenko, Olga. "Ethanol-Gasoline Fuel Blends May Cause Human Health Risks and Engine Issues." May 2009. Accessed online 23 February 2011 at <http://www.ewg.org/biofuels/report/Ethanol-Health-Risks-and-Engine-Damage>.

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- (1) Allow the ethanol tax credit to expire in 2011 and eliminate other oil subsidies and tax breaks;
- (2) Reject corn ethanol industry proposals to fund grants and back loan guarantees to support conventional biofuels infrastructure such as blender pumps, corn ethanol pipelines and mandates for flex-fuel vehicles, since this will further lock in corn ethanol's dominance;
- (3) Invest in focused research on advanced biofuels that significantly reduce greenhouse gases, do not compete with or displace food crops and are environmentally sustainable in both the short- and long-term, including those recommended by the Interagency Biofuels Task Force;
- (4) Reform the Renewable Fuels Standard by freezing and then phasing out conventional biofuels mandates and adding significant and enforceable environmental safeguards to the advanced biofuels mandate;
- (5) Focus on policies that would cut gasoline consumption by such steps as reducing vehicle trips, encouraging carpooling and investing in vehicles or forms of transportation that actually reduce dependence on fossil fuels.

To have any hope of protecting the environment, reducing dependence on fossil fuels and feeding the world, Congress must take immediate action to reverse course on ethanol policy.



April 27, 2011

The Honorable Barbara Boxer
Chairwoman, Senate Environment and Public Works (EPW) Committee
United States Senate
Washington, DC 20510

The Honorable James Inhofe
Ranking Member, Senate EPW Committee
United States Senate
Washington, DC 20510

Re: Letter before the Senate Environment and Public Works Committee oversight hearing on domestic renewable fuels, focusing on ethanol and advance biofuels (April 2011)

Dear Chairwoman Boxer and Ranking member Inhofe:

Many PMAA members will welcome the opportunity to sell greater ethanol blends, but concerns arise with the potential unintended consequences that create liability issues for retailers. PMAA supports expanded use of ethanol in our nation's fuel supply, however, until legal, regulatory, and financial concerns are addressed, greater ethanol usage will be minimal.

PMAA is a national trade association in the petroleum industry representing 8,000 independent petroleum marketing companies who own 60,000 retail fuel outlets such as gas stations, convenience stores and truck stops. Additionally, these companies supply motor fuels to 40,000 independently owned retail outlets and heating oil to seven million households and businesses. Of the 162,000 gasoline stations nationwide, nearly 97 percent are owned by small businesses. While they may sell a particular gasoline name brand, they are not owned by the major oil companies. Therefore, for a small business retailer to make the necessary upgrades to existing infrastructure to safely and legally sell greater ethanol blends, they must see an economic opportunity to market these new fuels.

Motorist misfueling is a great concern. Pay at the pump is very popular in the U.S., and a gas station or convenience store clerk is not in a position to stop a motorist from dispensing greater ethanol blends in an unapproved vehicle. Retailers need confidence that if the dispenser is labeled as specified by EPA, the retailer will not be held responsible for motorists' misfueling. Similarly, we need liability protection for retailers should mid-level ethanol blends damage a vehicle, so that the retailer will not be held responsible. For example, some experts believe greater ethanol blends could damage catalytic converters. The retailer must not be held responsible for repairs if he/she met every requirement specified by EPA. If EPA approves E15, they are in essence promising consumers that it will not damage their car. Retailers must not be held liable if it turns out that EPA was incorrect.

Another concern relates to underground storage infrastructure. We need EPA's Office of Underground Storage Tanks (OUST) to publish a list determining which storage tanks, piping, associated equipment, and dispensers are acceptable for greater ethanol blends. If a retailer does due diligence and confirms that his equipment meets EPA's standards, the retailer will then need protection from legal and insurance problems resulting from a leak caused by ethanol blends above ten percent. This topic relates to the Underwriters Laboratory (UL) certification requirement. Currently, very little existing infrastructure is UL certified for anything higher than 10 percent alcohol. If problems arise, we do not want fire officials citing retailers for not having UL certification. In the same sense, we do not want insurance companies using the UL certification requirement as a basis for denying a marketer's claim. Finally, it is unfortunate if the only way for a retailer to be absolutely certain that his liability is limited, is to replace all underground storage tanks, piping and dispensers – a very costly and unlikely scenario without significant tax and grant programs.

USDA Blender Pump Program

Some PMAA member companies see the blender pump infrastructure proposal is a thinly veiled attempt at getting 100 percent of the cost of dispensers paid for, with little or no thought given to the underground issues. We are concerned that some retailers will sell E15 due to the price advantage compared to E10 while not confirming that the underground equipment is compatible with anything over E10. Additionally, there are concerns that retailers will install blender pumps

in counting on marketer funded state tank funds to cover any releases. This would increase state tank funds for every marketer even for the ones that play by the rules in making sure that their underground equipment is compatible with E15.

EPA's Office of Underground Storage Tanks (OUST) E15 Compatibility Guidance

Recently, EPA's Office of Underground Storage Tanks (OUST) released its Notice of Proposed Guidance (NPG) to interested parties that would clarify its compatibility requirement for UST systems storing E15. This is an interim guidance period which is subject to change when EPA determines what compatibility means in its Notice of Proposed Rulemaking likely to be issued this summer. Guidance is just a suggested road map that marketers and states could use to determine the compatibility of E15 with legacy equipment.

PMAA would like to see the EPA OUST develop a risk-based assessment tool for legacy UST equipment that could be used to determine system compatibility. Risk assessments could be based on the age of equipment in the ground, the type of tank used in the system, such as single wall, double wall, fiberglass, lined, or steel tank, the type of piping, leak detection systems and release prevention equipment used in the system. Once a risk assessment judgment is made on the system, a compatibility determination can be made. A compatibility finding could also be conditioned on additional requirements that must be met before the system qualifies for E-15 service. A risk based system for determining compatibility would be cost effective and a reliable indicator of which systems is suitable for E-15 use. **For example, if the federal government's blender pump grant program could also be directed at investments in electronic leak detection systems, this could help satisfy compatibility requirements even if a retailer was uncertain whether piping, glues, adhesives was fully compatible with a higher ethanol blend.** The electronic leak detection would notify a retailer within a matter of minutes if there was a leak and the retailer could then take the proper steps to clean up the leak. Electronic leak detection systems are very effective for quickly finding a leak underground and would be a cost effective way for retailers to determine compatibility with mid-level ethanol blends.

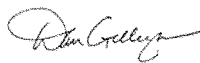
Biofuels Infrastructure Grants/Tax Credits

Financially speaking, grant programs focused solely on dispensers is inadequate and can potentially be a public safety concern. Underground leaks from piping and tanks do occur and it is important that the proper precautions are taken to ensure that the tank and piping is compatible to handle E10 plus fuels and that the tank is thoroughly clean and water is not present in the tank. One underground storage leak can force a retailer out of business. **A \$100,000 grant per site** that is applicable to underground storage tanks, piping, submersible pumps, drop tubes, level sensors, and blender pumps may encourage retailers to make the necessary upgrades to market greater ethanol fuels in addition to tax credits. Additionally, marketers must be reimbursed within 30 to 60 days.

Additionally, the current alternative fuel tax credit must be increased to a minimum of \$250,000 for a potential 50 percent credit worth \$125,000 per site. The credit must be eligible to be carried back at least 2 years and forward 20 years and must be applicable to blender pumps and all associated underground infrastructure. The credit must also be eligible for 100 percent of the cost of a complete blender pump. This may incentivize the station owner to make the necessary upgrades to market greater ethanol blends. Additionally, if USDA/DOE wants to entice a retailer to replace perfectly serviceable infrastructure currently compatible with E10 (in many cases only one-third to one-half through the expected useful life), USDA and DOE will need to provide significant financial assistance.

Again, PMAA would like to emphasize the legal and regulatory concerns which continue to hold E15 hostage from entering the nation's fuel supply. Absent legal and regulatory certainty for E15, very few retailers, if any, will be able to legally sell E15 which will delay the expansion of ethanol use in the U.S.

Sincerely,



Dan Gilligan
PMAA



Statement of the
National Association of Convenience Stores (NACS)
Submitted for the Record
Senate Committee on Environment and Public Works
“Oversight Hearing on Domestic Renewable Fuels: From
Ethanol to Advanced Biofuels”
April 13, 2011

The Association for Convenience & Petroleum Retailing

1600 Duke Street • Alexandria, VA 22314-3436 • (703) 684-3800 • FAX (703) 636-4564 • www.nacsonline.com

On behalf of the member companies of the National Association of Convenience Stores (NACS), thank you for convening this important hearing on the future of renewable fuels. We hope that our comments will help the Committee to identify strategies to overcome existing hurdles and successfully achieve the objectives of the Renewable Fuels Standard (RFS).

BACKGROUND

NACS is an international trade association comprised of more than 2,200 retail member companies and more than 1,800 supplier companies doing business in nearly 50 countries. As of December 31, 2010, the U.S. convenience and fuel retailing industry operated 146,341 stores of which 117,297 (80.2%) sold motor fuels. In 2009, our industry generated \$511 billion in sales (one of every 28 dollars spent in the United States), employed more than 1.5 million workers and sold approximately 80% of the nation's motor fuel.

Our industry is dominated by small businesses. In fact, of the convenience stores that sell fuel, 57.5% of them are single-store companies – true mom and pop operations. Despite common misperceptions, the large integrated oil companies are leaving the retail market place and today own and operate fewer than 2% of the retail locations. Although a store may sell a particular brand of fuel associated with a refiner, the vast majority are independently owned and operated and the relationship to the fuel brand they sell ends there. The rest have sought to establish their own brand in the market.

NACS members make decisions each day regarding what products to sell and which services to offer their customers. But taking a chance by offering a new candy bar is very different from switching their fueling infrastructure to accommodate a new fuel. For this reason, and many others, they are often slow to adopt new fuel products until they are certain sufficient consumer demand exists to provide a reasonable return on their investment – an investment which in many cases can be significant.

Our industry is committed to complying with today's laws and regulations, to provide our customers with the best products and services we can offer and to adapt to new technologies and market opportunities as they arise. NACS members are not beholden to any specific product – they simply desire to sell what the customer wants to buy provided it is lawful and, hopefully, profitable to do so. As new fuels come onto the market, our members want to have the legal option to sell these fuels if their customers wish to buy them.

CHALLENGES

The RFS was developed to promote energy independence, reduce our reliance on fossil fuels and benefit the environment. It set ambitious goals and focused on the materials used to produce our fuel. It did not, however, take into consideration how the fuel would be delivered into the consumer's vehicle. The distribution and retail infrastructure was largely ignored in favor of broader policy issues, yet it is precisely this component of the system that is presenting some of the greatest obstacles to successful implementation of the program.

From NACS' perspective, the following are the core challenges limiting the retail availability of new renewable fuels:

Compatibility

The reason the retail market is unable to accommodate additional volumes of renewable fuels begins with the equipment found at retail stations. By law, all equipment used to store and dispense flammable and combustible liquids must be certified by a nationally recognized testing laboratory. These requirements are found in regulations of the Occupational Safety and Health Administration.¹

Currently, there is essentially only one organization that certifies such equipment – Underwriters Laboratories (UL). UL establishes specifications for safety and compatibility and runs tests on equipment submitted by manufacturers for UL listing. Once satisfied, UL lists the equipment as meeting a certain standard for a certain fuel. Prior to last spring, UL had not listed a single motor fuel dispenser (a.k.a, pump) as compatible with any fuel containing more than 10% ethanol. This means that any dispenser in the market prior to last spring is not legally permitted to sell E15, E85 or anything above 10% ethanol – even if it is technically able to do so safely.

If a retailer fails to use listed equipment, that retailer is violating OSHA regulations and may be violating tank insurance policies, state tank fund program requirements, bank loan covenants, and potentially other local regulations. Furthermore, if the retailer experiences a petroleum release from that equipment, he could be sued on the grounds of negligence for using non-listed equipment, which would subject him to penalties above and beyond the cost of remediation.

This brings us to the primary challenge: If no dispenser prior to early 2010 was listed as compatible with E10+ fuels, what options are available to retailers to sell E10+ fuels?

In February 2009,² UL issued a letter announcing that dispensers listed under a certain UL standard as compatible with E10 were in fact safe to handle fuels containing up to 15% ethanol. UL said that it would support “local authorities having jurisdiction” to provide waivers to retailers who wished to increase their ethanol blends through these dispensers. UL did not, however, change the official certification of those dispensers. Consequently, retailers who relied upon local authority waivers would still be in violation of all laws and regulations requiring listed equipment.

However, in December 2010³ UL rescinded that notice based upon new research that indicated issues with gaskets, seals and hoses when exposed to E15. UL now recommends that only equipment specifically listed by UL as compatible with E10+ fuels be used for such fuels.

¹ 29CFR1926.152(a)(1) “Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids.” “Approved” is defined at 29CFR1910.106 (35) “Approved unless otherwise indicated, approved, or listed by a nationally recognized testing laboratory.”

² Underwriters Laboratories.

(http://www.ul.com/global/eng/pages/corporate/newsroom/newsitem.jsp?cpath=%2Fglobal%2Feng%2Fcontent%2Fcorporate%2Fnewsroom%2Fpressreleases%2Fdata%2Funderwriterslaboratoriesannouncessupportforauthoritieshavingjurisdiction20090219140900_20090219140900.xml)

³ Underwriters Laboratories.

(<http://www.ul.com/global/eng/pages/offering/industries/energy/alternative/flammableandcombustiblefluids/updates/>)

Unfortunately, this places a significant economic burden on the retail market. UL policy prevents retroactive certification of equipment. In other words, only those units produced after UL certification is issued are so certified – all previously manufactured devices, even if they are the same model, are subject only to the UL listing available at the time of manufacture. This means that no retail dispensers, except those produced after UL issued a listing last spring, are legally approved for E10+ fuels.

In other words, under current requirements any retailer wishing to sell E10+ fuels must replace their dispensers. On average, a retail motor fuel dispenser costs approximately \$20,000.

It is less clear how many underground storage tanks and associated pipes and lines would require replacement. Many of these units are manufactured to be compatible with high concentrations of ethanol, however they may not be listed as such. Further, if there are concerns with gaskets and seals in dispensers, care must be given to ensure the underground gaskets and seals do not pose a threat to the environment. Once a retailer begins to replace underground equipment, the cost can escalate rapidly and can easily exceed \$100,000 per location.

Misfueling

The second major issue facing retailers is the potential liability associated with improperly fueling a vehicle with a non-approved fuel. The EPA decision concerning E15 puts this issue into sharp focus for retailers. Under EPA's partial waiver, only vehicles manufactured in model year 2001 or more recently are authorized to fuel with E15. Older vehicles, motorcycles, boats, and small engines are not authorized to use E15.

For the retailer, bifurcating the market in this way presents serious challenges. How does the retailer prevent the consumer from buying the wrong fuel? Typically, when new fuels are authorized they are backwards compatible so this is not a problem. In other words, older vehicles can use the new fuel. In addition, new vehicles were required to run on the new fuel, thereby guaranteeing market demand. Neither is the case with E15 and other mid-level ethanol blends.

Example 1: When EPA phased lead out of gasoline in the late 1970s and early 1980s, older vehicles were capable of running on unleaded – newer vehicles, however, were required to run only on unleaded. These newer vehicle gasoline tanks were equipped with smaller fill pipes into which a leaded nozzle could not fit – likewise, unleaded dispensers were equipped with smaller nozzles.

Example 2: When EPA mandated a 97% reduction in the sulfur content of on-road diesel fuel, trucks manufactured beginning with model year 2007 were required to use only ultra low sulfur diesel (ULSD) fuel. Earlier model trucks were able to run on this new fuel. Misfueling was limited by a combination of a mandated oversupply of ULSD (which limited the supply of the restricted fuel and therefore limited the potential for misfueling) and enforced labeling requirements.

E15 is very different – legacy vehicles are not permitted to use the new fuel. Doing so will violate Clean Air Act standards and could cause engine performance or safety issues. Yet, there

are no viable options to retroactively install physical countermeasures to prevent misfueling. Further, the risk to retailers of a customer using E15 in the wrong engine – whether accidentally or intentionally - are significant.

First of all, retailers could be subject to penalties under the Clean Air Act for not preventing a customer from misfueling with E15. This concern is not without justification. In the past, retailers have been held accountable for the actions of their customers. For example, because unleaded fuel was more expensive than leaded fuel, some consumers used can openers to physically alter their vehicle fill pipes to accommodate the larger leaded nozzles or used a funnel while fueling. The retailer had no ability to prevent such behavior, but the EPA often levied fines against the retailer for not physically preventing the consumer from bypassing the misfueling countermeasures.

To EPA's credit, they have asserted that they would not be targeting retailers for consumer misfueling. But that provides little comfort to retailers – EPA policy can change in the absence of specific legal safeguards. Further, the Clean Air Act includes a private right of action and any citizen can file a lawsuit against a retailer who does not prevent misfueling. Whether the retailer is found guilty does not change the fact that defending against such claims can be very expensive.

Furthermore, the consumer may seek to hold the retailer liable for their own actions. Using the wrong fuel could void an engine's warranty, cause engine performance problems or even compromise the safety of some equipment. In all situations, some consumers may seek to hold the retailer accountable even when the retailer was not responsible for the improper use of the fuel. Once again, the defense to such claims can be expensive.

General Liability Exposure

Third, there are widespread concerns throughout the retail community and with our product suppliers that the rules of the game may change and we could be left potentially exposed to significant liability.

For example, E15 is approved only for certain engines and its use in other engines is prohibited by the EPA due to associated emissions and performance issues. What if E15 does indeed cause problems in non-approved engines or even in approved engines? What if in the future the product is determined defective, the rules are changed and E15 is no longer approved for use in commerce? There is significant concern that such a change in the law would be retroactively applied to any who manufactured, distributed, blended or sold the product in question.

Retailers are hesitant to enter new fuel markets without some assurance that their compliance with the law today will protect them from retroactive liability should the law change in the future. It seems reasonable that law abiding citizens should not be held accountable if the law changes in the future. Congress could help overcome significant resistance to new fuels by providing assurances that market participants will only be held to account for the laws as they exist at the time and not subject to liability for violating a future law or regulation.

Market Acceptance

The final challenge is the rate at which consumers will adopt the new fuels. Although ethanol is widely available in most gasoline at a 10% blend rate, it is not universally accepted by drivers. This raises concerns with retailers about their customers' reaction to the introduction of a new fuel.

For example, a NACS member who operates in Oklahoma has experienced direct backlash at the inclusion of ethanol in her fuel. At one particular location, she began blending up to 10% ethanol in her gasoline. Soon after she began doing this, her competitor across the street erected large signs advertising ethanol-free gasoline. A local television network aired a story on her store and her inclusion of ethanol, featuring consumers angry that they were buying ethanol-blended fuel. Her sales at this location dropped nearly 50% because of the backlash against ethanol. She promptly stopped blending ethanol into her fuel and her business began to recover.

This situation did not require any investment on the retailer's part – she simply began selling E10 through her existing infrastructure. However, the investment to sell E15 or E85 can be significant and without some indications of consumer demand for these products, many retailers may be hesitant to make the investment despite any government incentives to do so.

OPTIONS

NACS believes there are options available to Congress to help the market overcome these challenges.

- First, because UL will not retroactively certify any equipment, perhaps Congress could authorize an alternative method for certifying legacy equipment. Such a method would preserve the protections for environmental health and safety, but eliminate the need to replace all equipment simply because the certification policy of the primary testing laboratory will not re-evaluate legacy equipment. NACS was supportive of legislation introduced in the House last Congress as H.R. 5778. This bill directed the EPA to develop guidelines for determining the compatibility of equipment with new fuels and stipulates equipment that satisfied such guidelines would thereby satisfy all laws and regulations concerning compatibility.
- Second, Congress can require EPA to issue labeling regulations for fuels that are not authorized for all vehicles and ensure that retailers who comply with such requirements satisfy their requirements under the Clean Air Act and protect them from violations or engine warranty claims in the event a self-service customer ignores the notifications and misfuels a non-authorized engine. H.R. 5778 also includes provisions to achieve these objectives.
- Third, Congress can provide market participants with regulatory and legal certainty that compliance with current applicable laws and regulations concerning the manufacture, distribution, storage and sale of new fuels will protect them from retroactive liability should the laws and regulations change at some time in the future.

- And finally, if Congress takes action to lower the cost of entry and to remove the threat of unreasonable liability, more retailers may be willing to take a chance and offer a new renewable fuel. By lowering the barriers to entry, Congress will give the market an opportunity to express its will and allow retailers to offer consumers more choice. If consumers reject the new fuel, the retail – like the NACS member in Oklahoma – can reverse the decision without sacrificing a significant investment.

The nation's convenience and fuel retailers are ready to assist Congress in its consideration of policies that will promote a stable and efficient market for transportation fuels. There are many factors to consider and we hope that policymakers will proceed cautiously and avoid imposing unnecessary and costly burdens on the system.

Thank you for the opportunity to share our perspectives with the Committee.



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**Written Testimony of Manning Feraci
Vice President of Federal Affairs
National Biodiesel Board
Submitted to the U.S. Senate Committee on Environment and Public Works
“Oversight Hearing on Domestic Renewable Fuels: From Ethanol to Advanced Biofuels.”
April 13, 2011**

Executive Summary: Biodiesel is a renewable, low-carbon diesel replacement fuel. It is the only domestically produced, commercial-scale Advanced Biofuel – as defined by the Environmental Protection Agency (EPA) under the Renewable Fuels Standard (RFS2) program - that meets the specific ASTM D6751 fuel specification and is readily available and accepted in the U.S. marketplace. (Note: Biomass-based Diesel is an Advanced Biofuel under the RFS2 program, and in general, U.S. biodiesel produced from animal fats, recycled cooking oil, soybean oil, inedible corn oil derived from the ethanol production process, canola and algae qualifies as Biomass-based Diesel).

The U.S. biodiesel industry will meet the RFS2 program’s Advanced Biofuel goals. Statute requires the use of 800 million gallons of Biomass-based Diesel in 2011 and 1 billion gallons of Biomass-based Diesel in 2012. The U.S. has more than enough production capacity and available qualifying feedstock to meet the RFS2 Biomass-based Diesel volume targets for 2011 and 2012. Specifically, there is more than 2.12 billion gallons of domestic Biomass-based Diesel production capacity registered with the EPA under the RFS2 program and ample feedstock supply to meet the statutory targets for 2011 and 2012.

On November 23, 2010, the EPA issued the final rule implementing the RFS2 volume requirements for 2011. Under the rule, EPA requires 800 million gallons of Biomass-based Diesel in 2011 and up to 100 million gallons of additional biodiesel equivalent gallons in order to meet the total Advanced Biofuels requirement in 2011. Meeting the Advanced Biofuels goals provided for in the RFS2 program will allow the U.S. to recognize the energy security, job creation and environmental benefits associated with the expanded domestic production and use of biodiesel, and the U.S. biodiesel industry stands ready to meet the attainable volume Advanced Biofuel goals provided for in RFS2.

Chairman Boxer, Ranking Member Inhofe and Members of the Committee, I appreciate the opportunity to submit written testimony on behalf of the National Biodiesel Board (NBB) regarding this hearing on domestic renewable fuels. As producers of America’s only commercial-scale Advanced Biofuel, the U.S. biodiesel industry looks forward to working constructively with this committee to ensure that our nation’s Advanced Biofuel goals are met.

About NBB: NBB is the national trade association representing the biodiesel industry as the coordinating body for research and development in the U.S. It was founded in 1992, and since that time, the NBB has

developed into a comprehensive industry association which coordinates and interacts with a broad range of cooperators including industry, government and academia. NBB's membership is comprised of biodiesel producers; state, national and international feedstock and feedstock processor organizations; fuel marketers and distributors; and technology providers.

Background and Industry Overview: Biodiesel is a renewable, low-carbon diesel replacement fuel. The EPA has determined, based on the performance requirements established by the *Energy Independence and Security Act* (EISA) (P.L. 110-140), that domestically produced biodiesel is an Advanced Biofuel under the RFS2 program.

Biodiesel is made from waste greases like recycled cooking oil, animal fats and secondary use agricultural oils, and is refined to meet a specific commercial fuel definition and specification. The fuel is produced by reacting feedstock with an alcohol to remove the glycerin and meet the D6751 fuel specification set forth by ASTM International. Biodiesel is one of the most and best-tested alternative fuels in the country and the only alternative fuel to meet all of the testing requirements of the 1990 amendments to the Clean Air Act. There are approximately 150 biodiesel plants registered with the EPA, representing a combined production capacity in excess of 2.12 billion gallons.

Biodiesel is primarily marketed as a five percent (B5) blending component with conventional diesel fuel, but can be used in concentrations up to twenty percent (B20). It is distributed utilizing the existing fuel distribution infrastructure with blending occurring both at fuel terminals and "below the rack" by fuel jobbers.

RFS2 Provides for a Renewable Component in U.S. Diesel Fuel: Biomass-based Diesel is an Advanced Biofuel under the RFS2 program, and in general, U.S. biodiesel produced from animal fats, recycled cooking oil, soybean oil, inedible corn oil derived from the ethanol production process, canola and algae qualifies as Biomass-based Diesel. The U.S. biodiesel industry is today the only domestic, commercial-scale producer of Biomass-based Diesel.

To qualify as Biomass-based Diesel, the fuel must reduce greenhouse gas (GHG) emissions by 50% compared to conventional petroleum diesel. In addition, the fuel must be produced from qualifying renewable biomass, as defined by statute under EISA.

RFS2 requires the use of 800 million gallons of Biomass-based Diesel in 2011 and 1 billion gallons in 2012. From 2013 through 2022, a minimum of 1 billion gallons must be used, and the Administrator of the EPA, in consultation with the Secretary of Agriculture and the Secretary of Energy, is given the authority to increase the Biomass-based Diesel volume requirement.

By statute, the RFS2 Program addresses several specific policy goals as it pertains to biodiesel and the nation's overall mix of transportation fuels. First, to achieve nationwide goal of displacing foreign petroleum, the RFS2 program in general and the Biomass-based Diesel volume requirement specifically ensures that minimum goals for petroleum diesel displacement are met. In addition, the RFS2 achieves the desired policy goal of reducing GHG emissions associated with the use of transportation fuels.

EPA 2011 Renewable Volume Obligations (RVOs) are Consistent with Statutory Requirements and Marketplace Realities: In general, the RFS2 program requires the EPA to annually issue a rule that establishes the RFS2 volumes requirements for obligated parties in the coming year. Accordingly, the EPA Administrator signed a rulemaking on November 23, 2010 setting the program's volume obligations for 2011.

The U.S. biodiesel industry agrees with EPA's assessment in this rule that U.S. biodiesel production is capable of meeting the RFS2 Advanced Biofuels targets. Specifically, EPA noted:

Based on our review of current biodiesel production rates, the production potential of the biodiesel industry, and the availability of qualifying feedstocks, we believe that substantially more than the 800 million gallons needed to satisfy the biomass based diesel standard can be produced in 2011. ... We also believe that the excess production capacity can be utilized to help satisfy the 2011 advanced biofuel standard
75 Fed. Reg. 76,790, 76,802.

U.S. Biodiesel Industry is Prepared to Meet RFS2 Advanced Biofuel Goals Established by Congress: The U.S. has more than enough production capacity and available qualifying feedstock to meet the RFS2 Biomass-based Diesel volume targets for 2011.

Specifically, there is more than 2.12 billion gallons of domestic Biomass-based Diesel production capacity registered with the EPA under the RFS2 program to meet the statutory targets for 2011 and 2012. Further, there is ample feedstock to support the production of Biomass-based Diesel production at levels in excess of the RFS2 program's Advanced Biofuel volume obligations. By conservative estimates, there is domestic feedstock available to support 1.77 billion gallons of annual biodiesel production in the United States, which is more than is required under the RFS2 for 2011.

Biodiesel is fungible in the nation's fuel infrastructure. It is worthwhile to note that 82 registered terminals have officially installed biodiesel blending capacity at the terminal rack, and that number is certain to grow. Biodiesel meets ASTM D6751, a specific performance-based commercial fuel specification formulated by ASTM International, which is widely accepted in the marketplace. Biodiesel blends are widely distributed via pipelines in Europe, and currently, biodiesel is being distributed by pipeline in a number of U.S. markets. Pipeline distribution will also expand as minor technical issues pertaining to the comingling of fuels are resolved.

The combination of necessary production capacity; available feedstock; and a fuel that is fungible in the marketplace ideally positions the U.S. biodiesel industry to meet and exceed the 2011 Advanced Biofuel goals established by the RFS2 program.

Biodiesel Marketplace Needs Stable and Reliable Regulatory Framework: At this early stage of the U.S. biodiesel industry's development, the rules governing the Advanced Biofuel volume requirements under the RFS2 program have a significant impact on the biodiesel marketplace. The delay in finalizing regulatory guidance to the private sector (final rule was signed 25 months after enactment of EISA, and 13 months beyond the program's statutory effective date) created uncertainty in the biofuels marketplace, which in turn hindered the ability of businesses to access capital and make long-term investment decisions.

Conversely, the conclusion of the 25-month rulemaking process and implementation of the RFS2 Advanced Biofuel program removes uncertainty and provides clear guidance to the marketplace. A stable regulatory environment in 2011 will allow the U.S. biodiesel industry to meet the nation's overall goals of displacing at least 800 million gallons of petroleum diesel with a domestically produced and commercially viable Advanced Biofuel that significantly outperforms the emission profile of conventional petroleum diesel fuel.

The U.S. biodiesel industry wants to work constructively with Congress to ensure that the RFS2 program is administered in a manner that provides a stable regulatory environment for Advanced Biofuel producers and other marketplace stakeholders. Towards this end, the U.S. biodiesel industry would ask Congress to avoid statutory restrictions on the routine rulemaking procedures that are needed to administer the RFS2 program. Similarly, the NBB encourages Congress to avoid legislative revisions to RFS2 that could undermine marketplace and investor confidence in the program.

Biodiesel Public Policy Benefits: Moving forward, the RFS2 program will help achieve the worthwhile policy goal of increasing the production and use of Advanced Biofuels in the U.S. There are compelling public policy benefits associated with the enhanced production and use of biodiesel in the U.S.

Biodiesel Reduces our Dependence on Foreign Oil: Biodiesel can play a major role in expanding domestic refining capacity and reducing our reliance on foreign oil. The 2.2 billion gallons of biodiesel produced in the U.S. since 2005 has displaced an equivalent amount of diesel fuel with a clean-burning, efficient fuel that reduces lifecycle carbon dioxide emissions by as much as 86 percent compared to petroleum diesel fuel and creates 4.56 units of energy for every unit of energy that is required to produce the fuel.

Biodiesel is Good for the Environment: Biodiesel is an environmentally safe fuel, and is the most viable transportation fuel when measuring its carbon footprint, life cycle and energy balance. Based on EPA's lifecycle analysis, biodiesel reduces GHG emissions by as much as 86 percent when compared to petroleum diesel fuel. Since 2005, biodiesel's contribution to reducing GHG emissions is equal to removing 3.12 million passenger vehicles from America's roadways.

Biodiesel's emissions significantly outperform petroleum diesel. Biodiesel emissions have decreased levels of all target polycyclic aromatic hydrocarbons (PAH) and nitrated PAH compounds, as compared to petroleum diesel exhaust. These compounds have been identified as potential cancer causing agents.

Biodiesel is the only alternative fuel to voluntarily perform EPA Tier I and Tier II testing to quantify emission characteristics and health effects. That study found that B20 (20 percent biodiesel blended with 80 percent conventional diesel fuel) provided significant reductions in total hydrocarbons; carbon monoxide; and total particulate matter. Research also documents the fact that the ozone forming potential of the hydrocarbon emissions of pure biodiesel is nearly 50 percent less than that of petroleum fuel. Pure biodiesel typically does not contain sulfur and therefore reduces sulfur dioxide exhaust from diesel engines to virtually zero.

The Biodiesel Industry is Creating Green Jobs and Making a Positive Contribution to the Economy: In 2011, the NBB estimates that the U.S. biodiesel industry will support over 30,000 jobs in all sectors of the economy. This will add more than \$3 billion to the nation's Gross Domestic Product (GDP).

The Biodiesel Industry Stimulates Development of New Low-Carbon Feedstocks: The feedstock used to produce U.S. biodiesel has increasingly diversified, with waste products such as animal fats, recycled cooking oil and other inedible waste agricultural oils making up more than half of the feedstock used to produce fuel. Biodiesel production is currently the most efficient way to convert lipids into low-carbon diesel replacement fuel, and as a result, industry demand for less expensive, reliable sources of fats and oils is stimulating promising public, private and non-profit sector research on second generation feedstocks such as algae.

Conclusion: The U.S. biodiesel industry is proud to produce the only domestic, commercial-scale Advanced Biofuel that is readily available and accepted in the marketplace. Further, NBB's membership has both the production capacity and available feedstock to meet the RFS2 program's Advanced Biofuel goals.

In addition, continued implementation of the RFS2 program will allow our nation to reap the significant energy security, economic, and environmental benefits associated with displacing petroleum diesel fuel with Advanced Biofuels like biodiesel. Accordingly, the U.S. biodiesel industry encourages Congress to promote stability and predictability in the fuels marketplace by refraining from legislative revisions or restrictions that could hinder administration of the RFS2 program.

Chairman Boxer, Ranking Member Inhofe and Members of the Committee, I again appreciate having the opportunity to submit written testimony on this issue of significant importance to the U.S. biodiesel industry.

**Written Testimony of Thomas Elam
President, FarmEcon LLC
Carmel, Indiana
On Behalf of the National Turkey Federation**

Chairwoman Boxer, Ranking Member Inhofe and members of the committee, I thank you for the opportunity to submit this written testimony. I am an agricultural consultant based in Carmel, Ind. My professional experience spans 38 years and includes service to the University of Illinois, the U.S. Department of Agriculture (USDA) Economic Research Service, the Elanco agricultural division of Eli Lilly, and eight years of professional agricultural consulting. I have studied and written extensively on the subject of biofuels policy and grain prices. I would like to offer an expert opinion on the impact of U.S. biofuels policy on food production costs, the U.S. economy, and U.S. energy and food security.

In summary, U.S. ethanol policy has drained the world's grain reserves, added little, if any real value to the U.S. economy, and has significantly raised the cost of U.S. and global food production. The current biofuels policy made the United States no more energy secure, but has substantially reduced food security. Effects of U.S. ethanol policy have occurred at a time when the global grain supply and demand balance was already leading to higher grain prices, and has added to higher food costs and prices.

Congress passed, and President Bush signed, in December 2007, the Energy Independence and Security Act. That legislation set new and ambitious mandates for use and production of biofuels, especially corn-based ethanol. In light of market realities that are very different from the assumptions of only three years ago, Congress now needs to re-evaluate the

2007 policy. However well-intended, policy has had the effect of boosting grain demand, increasing food production costs, but with little or no positive impact on the economy.

Beginning with the impact on the overall U.S. economy, the increase in ethanol production since 2007 has not increased economic activity. As a result of no impact on the overall economy, total employment has not increased as a result of ethanol mandates and subsidies. The reason for this lack of impact is that mandated ethanol production increases have displaced, and in some cases reduced, economic activity elsewhere in the economy.

Increased ethanol production has not increased the amount of auto fuel produced, miles driven or automobile production. It has replaced oil refining activity and gasoline sales. Similarly, the increased volumes of distiller's grains produced as a by-product of ethanol plants has not increased the animal feed supply, it only replaced some of the corn that was used to produce ethanol. Since 2008 total U.S. meat and poultry production has decreased 3.3 percent, costing the economy in reduced Gross Domestic Product (GDP) and employment. Reduced meat and poultry production means less feed produced, fewer jobs in meat and poultry processing plants, and fewer farmers needed to raise chickens, turkeys, hogs and cattle. Most of those losses occurred in small towns and rural areas.

Increased ethanol production has had no significant effect on farming jobs or economic activity. Corn and soybean acreage has grown, but at the expense of plantings of wheat, rice, dry edible beans and other food crops. Total U.S. harvested acreage of major food and feed crops since 1990 has hovered around 290 million to 292 million acres. However, major food crop harvested acreage has declined from 85.8 million acres in 1990 to only 59.0 million in 2010 (31%). Essentially all of the acres lost for food crop production have gone to corn and soybeans,

the two crops that supply feedstocks for subsidized and mandated ethanol and biodiesel. When biofuel advocates state that the U.S. policies have had no effect on food production they are apparently not looking at the reality of these massive acreage shifts that have reduced U.S. food crop production potential or the economic impact of those reductions.

Merchants and distributors of food crops have experienced reduced sales volumes and job opportunities. As already mentioned, fewer farmers are also needed to produce a smaller supply of meat and poultry.

Farmland owners have benefited enormously from higher land prices, but land rental costs have risen for grain farmers who actually plant and grow crops. Therefore, the benefits of higher grain prices have gone to land owners, not the hard working farmers who often rent land. In economic terms we refer to the increase in land prices as a "windfall gain." The windfall gain has not increased production capacity by making more land available, or served any other useful economic purpose. Increased land prices have brought no more land into cultivation for one simple reason; we are already farming all the good land that is available.

Biofuels add few, if any, jobs or sales volume in fuel distribution and retailing. All they do is replace gasoline and diesel that was already moving through blending stations and retail fuel pumps. To the extent that ethanol may have a small positive impact is due to the fact that ethanol reduces fuel economy, resulting in a few more motorist trips to gas stations. I find it difficult to regard this as a benefit.

Ethanol proponents have cited reduced petroleum imports as an economic benefit to the economy. The Renewable Fuels Association has stated that ethanol displaced 440 million barrels of 2010 petroleum imports. That is not possible. A barrel of petroleum contains 42

gallons. The claimed 440 million barrels is 18.4 billion gallons. In 2010, the United States produced 13.23 billion gallons of ethanol. Since ethanol has only two-thirds of the energy of gasoline, the petroleum equivalent is only 8.86 billion gallons, and that excludes a significant amount of petroleum used to produce ethanol. It simply is not possible for the energy in 1 gallon of ethanol production to replace more than 2 gallons of gasoline energy.

If the United States did displace 8.86 billion gallons of petroleum in 2010, the value would be about \$16 billion. However, I have calculated that the system-wide 2010 cost impact of the ethanol policy was about \$25 billion for corn alone. Including the indirect impact on wheat, soybeans and other crop prices, the impact is considerably larger. Any benefit flowing from lower fuel imports is swamped by higher costs elsewhere in the economy. The net result is a loss of real economic activity and jobs.

Has the biofuels policy helped increase U.S. "energy security" by lowering petroleum imports? The answer is an unqualified no. As recent events demonstrate, the United States quite obviously is exposed to global oil markets and prices. In fact, even if the United States somehow managed to eliminate the need to import any oil from the Organization of the Petroleum Exporting Countries (OPEC), we would be no more secure than we are today. The U.S. oil price is the world price. Political issues in the Middle East that affect the world oil price will affect U.S. markets, even if we don't buy a single barrel of OPEC oil.

In fact, "energy independence" is a phantom goal as long as the United States engages in global commerce. If by some miracle we manage to eliminate all energy imports, a spike in global oil prices would lead to U.S. producers increasing exports, lowering U.S. energy supplies,

higher prices, and less energy available for U.S consumption. We simply cannot be “energy independent” and a trading nation at the same time.

Next, I would like to discuss the impact on the food sector. How did ethanol policy cause grain and other commodity prices to increase? The policy has reduced the supply of grains available for food production. Including the tonnage of distiller’s grains (DG) production added back to the U.S. feed supply, net U.S. feedgrain production available to users other than ethanol plants has declined precipitously since 2007. From the 2007 total U.S. feedgrain crop there was a net of 298 million metric tons (mmt) of grain and DG left after ethanol use. From the 2010 crop there will only be 250 mmt left for all users after ethanol production. The United States is covering a portion of that 48 million tons of loss volume by drawing down the feedgrain stocks from 48 million tons last year to only 21 million on Sept. 1, 2011. That 21 million ton figure is barely enough to keep the grain supply system running, and is the basic reason that corn prices are more than \$7 per bushel, and also extremely volatile.

Since the use and production of ethanol enjoys the protection of the Renewable Fuel Standard (RFS), feed and food users have been forced to make the entire adjustment to lower net grain supplies. USDA is forecasting that 2011-2012 U.S. feedgrain and soybean supplies will remain very tight, and prices high and volatile. Absent alterations in biofuels policy, U.S. food production costs will likely continue to increase and production is likely to decline further.

We have actually reached a point where any significant weather issues that would effect the 2011 U.S. grain crops will have potentially devastating implications for U.S. food prices and security. The U.S. reserve stocks are depleted. The United States cannot fall back on them again as we did this year. Another increase in the corn-based ethanol RFS is mandated for 2011 and

2012. Already, the 2011 U.S. wheat crop is experiencing major drought problems in the High Plains. We may be just a few months away from food shortages and much higher food prices.

Aggravating an already reduced net supply of grains, for technical reasons we are nearing the upper limit of U.S. DG feed use. The result is that U.S. DG exports are increasing rapidly, reducing further the feed supply available for U.S. meat and poultry production. Future DG supply increases from increased corn-based ethanol production are likely to be going to export channels, even further reducing the net supply of U.S. feeds.

We have also had a significant affect on global grain markets and food costs. Including DG production effects, U.S. ethanol production will withdraw a net of 3.9 percent from the 2010 global grain crop versus 2.4 percent for the 2007 crop. I have estimated that the effect of this net reduction in 2010-crop grain availability for food production is about \$60 per metric ton. The estimated impact of U.S. ethanol policy on the cost of global grains alone is \$130 billion. Including indirect price impacts on other food commodities the effect is much larger. A portion of the political unrest in Africa and the Middle East can be attributed to higher food costs. In a very real sense, the U.S. ethanol policy that was designed to lower our exposure to global oil markets and Middle East political developments has had the exact opposite effect.

Finally, I would like to offer an opinion on what needs to be done with U.S. energy policy.

The Volumetric Ethanol Excise Tax Credit (VEETC), or blender's credit, is not required to support ethanol production. However, it does add to the U.S. federal deficit and food and energy production costs. The RFS sets an effective demand floor for U.S. ethanol production and use. The VEETC is redundant and should be eliminated or phased out over a short time

period. Removing the VEETC credit would help rein in U.S. and global food price inflation and reduce the federal deficit, but still would not result in corn prices falling to anywhere close to pre-2008 levels.

Limited expansion capability for corn production together with the expanded RFS have driven net feed supplies and stocks available for uses other than ethanol to critically low levels. If the VEETC is eliminated, the cost of feedgrains for all users, including ethanol refiners, will fall. However, that alone does not solve the physical imbalances that have reduced the net supply of feedgrains available for food production, and substantially reduced U.S. acreage of food crops. In light of the realities of grain supply and demand, Congress should also re-evaluate the corn-based RFS schedule for 2011 through 2015. A fair and balanced approach for the overall good of the U.S. economy would give increased weight to food production costs and food security, and less weight to biofuel production. It is further suggested that if there is to be an RFS, it should be flexible and based on market conditions.

Thank you again for the opportunity to contribute to this critically important debate.